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SCHOOL OPENING NUMBER

It is but a matter of days before the school year 1938–1939 opens. The September issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION for that reason has been filled with material designed to assist the teacher of the industrial-arts laboratory and of the vocational-school shop in preparing for the moment when he steps before his first class of the new school year.

Articles of especial interest have been chosen for this issue, therefore, and attention is called to the following articles that are thought to be particularly helpful at this time: "Progressive Industrial Arts," Dean M. Schweickhard; "Leaving the Crossroads in Teacher Education," Lawrence F. Ashley; "Socialized Publicity," Glen O. Wise; "Obtaining Occupational Information," C. K. Lush; "New Emphasis in American Education," Deyo B. Fox; "Selecting, Planning, and Constructing a Project," George A. Willoughby. There are two articles of special value to the printshop teacher; the one, "Evolution of Printing," by Glen U. Cleeton, and the other "How to Start Out a Printshop Class," by R. Randolph Karch.

The offerings of the month also contain a "Pretest for Students in Woodworking" that will be found interesting as well as helpful. Besides these, there are a number of exellent problems for teachers of metalwork, woodwork, and ceramics.

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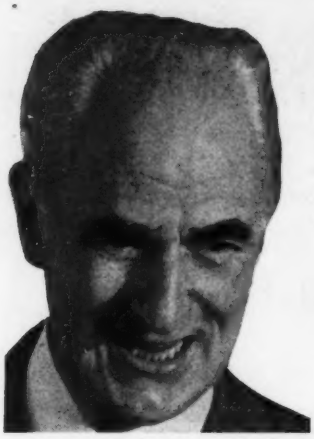

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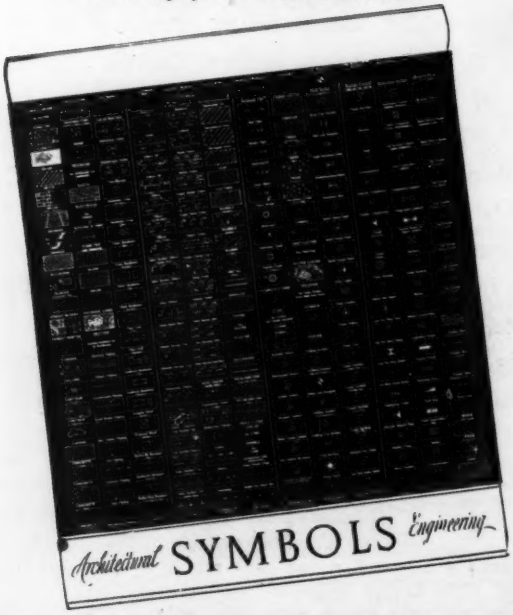

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INSTRUMENTS — EQUIPMENT — AND MATERIALS — *for the Student of Drafting*

September, 1938
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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

Progressive Industrial Arts

D. M. Schweickhard

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A thoughtful article in which the influence exerted by the industrial arts on other educational fields is interestingly portrayed.

To brand any phase of education as progressive may at once create certain prejudices, either for or against it in the minds of many readers. In the application of this term to industrial arts some will be pleased, others surprised; some may even be shocked, and others bewildered. In some minds there may spring up a feeling of incongruity, but for those who have known the program over a period of years, and have seen it progress from one stage to another, always in the attempt at adaptation to changing conditions, there will exist a certain sense of appropriateness.

Terms of this sort create sets in the minds of those who see or use them, because of certain implications arising from former experience or contacts. The implication need not necessarily be one of close affiliation or association with the so-called progressive education movement except as it may possess like elements or have similar goals. Rather, the term *progressive* is used as a term of description meaning to move forward. Is there anyone who would say that the industrial-arts program should not be thus described or characterized, if it is to serve the needs of boys and girls in a world which refuses to stand still?

Too often a state of general confusion and constant change is mistaken for progress whereas, the important element to be kept in mind is the direction of movement. In driving a car or walking, no progress is made unless each mile or each step carries one definitely in the desired direction toward an established goal. Likewise, in an educational enterprise or undertaking progress must be determined by consistent movement toward the goals which have been established, with constant modifications along the way.

In a general sense the entire program of education must be unified in its direction of movement if permanent progress is to be made. Now and then, however, individual fields of work or subjects stand out from the rest in setting a new pace, or opening the way for new developments. Through the years in which industrial arts has been a part of the educational program, it has variously occupied two different positions. At times it has followed the lead of theorists in other fields. At other times, in varying degrees and in different localities, it has served to set the goal and the pace. While the process has been going on, it has not always been easy to see exactly where the leadership lies. But, looking back over the trail which has been covered, some indications may be detected.

Any field of education finds its greatest assurance of progress in stability and persistence. Perhaps the material aspects of industrial-arts education have served to keep people in that field more constantly aware of the necessity for maintaining these two fundamental characteristics. Regardless of the reason, teachers of industrial arts have held themselves to certain methods and practices until their usability and serviceability could be adequately judged. The individual instruction sheet had its beginning in the industrial-arts shop and more recently has taken root in the field of general education. The project method likewise was the natural outgrowth of manual activity as a part of education. The problem as a learning device was based upon the procedure from physical to mental. Job analysis began in the fields of practical education as a matter of necessity, and at first was frowned upon by academic educators. Occupational study had its inception in connection with industrial arts and closely allied studies. Vocational advisement and guidance were first attempted by teachers whose interests had long been in the direction of the practical use of education in lifework. All these things had their beginnings in industrial departments, but have long since come to be accepted and used as devices and guiding principles in most all education.

It is not impossible to remember when the industrial department was looked upon as somewhat beneath the level of academic work in the school. With the persistent adherence to the principles of organization and the methods of teaching just referred to, those departments have pulled themselves out of the realm of disrepute and have progressed far in being able thus to open the way for progress in other branches of education. The race has been singularly like the traditional race of the tortoise and the hare, since it has been upon regular and consistent movement forward that progress has been made, rather than upon spasmodic attempts at sudden movement. Let us hope that the forward march may continue upon the same fundamental basis.

Relation to Other Schoolwork

During practically every period of history since organized schools have existed and been supported at public expense, there has been a certain amount of objection to new features being introduced into the school and changes being made from the established order. One would think that these changes were mere inventions of school people in order to have something different than it had been before. Too little account is taken of the developments outside the school which make these internal changes necessary.

Much has been said recently about a new social order as if it were something which came about all of a sudden. There has never been a transition from one generation to the next without a change in the social order. Rather than coming all at once the social order is constantly changing. One of the characteristics which has attended recent modifications in the social order has been more limited economic opportunities for large masses of people. Closely related to this condition is the fact that the age for entrance into employment has been gradually rising, thereby closing to adolescent

youth the opportunity to be of any material assistance to themselves or their families in relieving strained financial circumstances.

The inevitable result in the school has been either modification or stagnation. With schools awake to their duty as they have been, there has been no other course to take but to move forward. A longer period of public-school life has become an absolute necessity. Enlarged rather than diminished programs of education and training have had to be adopted for all phases of life. This expansion of the school program has not come because of increased population, but rather on account of the inevitable changes beyond the control of the school.

Taking account of such changes, and the modification in schoolwork which is a necessary component, has demanded close attention to the avenues through which learning may travel more smoothly and arrive more surely. In seeking such avenues we discover rather readily that many of them have been the ones in regular and constant use in the field of industrial arts for a number of years. The combination of hand and mind in educational activities has recently blossomed out as though it were something newly discovered when as a matter of fact industrial-arts work served to reveal its possibilities and establish them substantially. Likewise, the practice of proceeding from the physical to the mental has been one long used in industrial arts, and offers strong possibilities for effective education under new conditions. Visual means of education were formerly looked upon as applicable chiefly in the manual activities, but within recent years have come to be recognized as possessing unlimited possibilities in many other fields formerly thought of as purely academic.

The service which industrial arts has performed in leading the way to the discovery of these channels and their usefulness, may now serve to point the way in seeking new ones which can be used with further effectiveness. Technical developments open the way for improved visual education. New processes in industry call for new techniques in handling and using old materials and ones not formerly utilized. The developments in industry and science likewise constitute a challenge to industrial teachers for new adaptations and the use of modern instruments and mechanical devices. The chief difficulty here lies in the acquisition of modern equipment in the face of strained or depleted school budgets. The ingenuity of industrial-arts teachers often serves as a saving factor in such a situation.

Another point of variance between the practice in general education and that in the industrial-arts field has been in the matter of grading. Records show that comparatively few pupils in industrial arts are given a grade of failure. When confronted with this fact, industrial-arts teachers have frequently taken one of two stands. They have either risen to defend their practice or they have attempted to excuse it. Neither of these extremities need be resorted to. Rather, it may be more beneficial to inquire into the reasons. One possible reason may have been that good teaching and good work have been done, and the students have actually deserved the grades they have received from the technical standpoint. Another possible reason may have been that industrial teachers have looked upon grades with a view differing from that of other teachers.

Abundant evidence in the fields of general education indicates that grades or school marks are now looked upon in an entirely different way than formerly. Commonly, children in the lower elementary grades receive no absolute marks whatever in school subjects. Their work is rather looked upon as satisfactory or unsatisfactory, or being in an intermediate stage of improving. Even in intermediate or upper grades there is a strong tendency to indicate the level of a pupil's accomplishment on the basis of his potential ability rather than upon an absolute standard. Accordingly, it would seem that throughout education in general there is coming to be accepted the same view regarding grades which industrial-arts teachers have held pretty much from the beginning.

Progress in School Relationships

There is little to be gained by patting oneself on the back and saying "see what we have done." Rather, a sound feeling of satisfaction in past and present accomplishments should be utilized in finding the way to further progress. A generation ago industrial-arts departments were organized on the basis of single lines of endeavor such as sloyd, the Russian exercise system, or in subjects such as woodwork or mechanical drawing. Little thought was given to relationships with other departments or even other lines of work in the same department. One seldom heard of correlation, integration, or numerous other terms which have more recently seemed to possess such magic meaning.

By contrast, the situation today is somewhat different, but throughout the country it is not at all uniform. The uneven growth and development have been due to invariable factors such as financial resources, the nature of the community, and the vision of the school authorities. The whole picture is much like a cornfield observed at the roadside as one travels along the highway. Parts of the field which have received a normal amount of moisture and sunshine are seen to be flourishing. The portions which have had too little moisture are shriveled with the heat, and those which have had too much moisture are yellow and devitalized.

The discovery of the necessary or desirable moves in the education of today does not carry with it the implication that these things could have been done a generation ago but merely have been neglected. On the contrary, it is an indication of an awareness to the need for change and the result of a gradual development to meet the changing needs of school and society.

In some schools today the industrial department embraces rather closely related courses in mechanical drawing, woodworking, metalworking, electricity, the various crafts, and power mechanics. All the work is characterized by a general application and includes information as well as manipulation. Shop electricity and laboratory electricity are beginning to be aware of each other's existence. The physics laboratory and power shops are working toward each other. Craftwork in the shop and work in the art departments are coming to have more in common. Even the shop teacher and the teacher of social studies are on speaking terms.

In any new movement or trend there are certain necessary precautions which need to be observed. The joining of forces such as those cited above possesses the potential danger of having one overshadow the other. The final outcome may be the destruction of both. More to be desired is the establishment of a new force stronger than either of the original ones, because of the uniting of strong points and elimination of weaknesses. The possibility of such an accomplishment lies in the attitude of the teachers involved rather than in any magic discovery of content of technical practice.

In the union of forces, industrial-arts teachers will need to be aware of the necessity for preserving the progress already made and the values thus far established. They will need to guard against the sacrifice of fundamental knowledge and skills. They will need to seek improved methods of acquiring this knowledge and these skills. Finally, they will need to seek new ends toward which these things may be utilized. At this point may we seek to recruit the same spirit of sound and intelligent planning which has characterized the program of industrial-arts education and its contribution to the educational cause.

Economic Significance

Simultaneously, with far-reaching changes which have been taking place in the industrial world and within the schools, there have been other gradual changes or evolutions bearing much of economic significance. Like the other sorts of changes, these economic factors have received increasing recognition from the standpoint of

reality in the schools. Regardless of our opinion as to the value of classical languages, once widely utilized but no longer in common use, the popular demand for such languages in the public schools has undergone a decided decline. At the same time there has been a growing interest in the study of occupations, sciences, and the fields of study having to do with human relationships.

The terms *general* and *applied* have become attached to an increasing number of subjects. At first thought these terms may not seem to possess any great or far-reaching significance, but the implication becomes one of a quest on the part of the pupil for schoolwork with a real life value. Even the child himself is being looked upon as an individual reality rather than a hypothetical being. He is dealt with as a living creature whose chief concern is being educated in how to live in a world of activity.

In the attempt to serve the child as he has thus come to be recognized, the schools are reaching out beyond their walls and not setting the limits around education with which it formerly was circumscribed. There has come to exist a recognition of the responsibility of the school for placement in jobs and satisfactory adjustment after placement. Teachers are coming to take a more common-sense view regarding economic problems and the approach to their solution. Formerly, it was considered beneath a teacher, or outside her realm of thinking, to devote much time to such problems. True, organized courses were offered in the principles of economics; but, in too many cases, they failed to make the connection between principle and practice.

Long-range observation of the industrial-arts program furnishes substantial reason to support the belief that this field of work has constituted a sound part of the foundation for these enlarged views and functions. For a considerable period general education was overtheoretical. On the other hand, vocational education in its beginning, and for too long a time following, was ultra-materialistic. Industrial arts involving the elements of both has served to temper the whole program. It has made some contribution to both the others, but has likewise drawn from both, for the strengthening of its program in the direction of progress.

By way of glimpses into the future, we may predict that industrial arts can continue to function in a still greater way. With its rather sound establishment in the educational system it can serve to lay the foundation for vocational education. Having been as generally accepted as it has been, it can serve to enrich general education more in the future than it has in the past and help the whole educational system to keep its feet on the ground.

Outside the school the industrial-arts forces can promote more economically sound relationships in the world of industry. In this direction it is entirely possible to contribute to the establishment of more intelligent procedures in business and industrial organization. This may sound presumptuous on the part of men who up to recently were looked upon as incapable of making any worth-while contribution in the outside world. However, men with the training and general caliber of many industrial-arts teachers today are thoroughly capable of helping to stabilize the human element in industry and business. Further, through conference and study of actual situations, they can be helpful in forecasting the effects of wage and employment fluctuations in terms of purchasing power. Another contribution sorely needed up to now but never adequately provided for lies in the direction of helping to educate workers with ability and judgment. This constitutes another continuing opportunity for service through industrial arts.

One of the greatest difficulties in the way of solving many of the present-day problems could be greatly relieved by the improvement of employer-employee relationships. In this connection industrial-arts teachers with sound training and stable foresight can help greatly in the education of employees to understand more than the mere processes of their trades. Likewise, they have in their hands the opportunity to educate prospective employers to know the worker's side of the story. In thus educating each force in the problems and welfare of the other lies the only path of economically sound relationships.

Social Values

There was a time when industrial arts was looked upon as having little connection with the development of social values of any sort. Particularly was this true as the industrial-arts program became variously vocationalized. Still there are many adherents to the industrial program who resist any reference to the word *society* as if it implied participation in social functions of some sort. We speak here of society in no such connection, but rather in its larger sense of the aggregation of human beings. From this standpoint industrial-arts teachers need to get a clear understanding of some of the social problems and their relation to the individual. For the improvement and progress of the teacher in the direction, there is unlimited opportunity in study courses, in selected reading, in observation, and in the world of experience.

From the standpoint of the work itself there are numerous opportunities for the discovery of aesthetic values. The appreciation of good design is capable of calling forth the finer qualities in the individual. The use of fine material, and an appreciation of its appropriateness in relation to other details most surely calls forth the finer characteristics in human nature. Excellent workmanship does fully as much to the heart of the worker as it does in inspiring those who observe it. In fact, the one who produces an article of good design, utilizing valuable material, through the right kind of workmanship, has acquired immeasurable values for himself, as well as for others.

Without attempting to raise the question of comparative merit attached to the theory of formal discipline, we can find much in the industrial-arts work which convinces us that the development of any sort of character traits must be accomplished through avenues, many of which have a tangible form. The thrill of personal accomplishment and visible evidence of it are elements of definite value in the formation of one's character. This might seem to savor of selfishness if it were not accompanied by a similar joy in seeing the accomplishment of one's associates. Such joy is ever present in the give and take of the industrial shop. Substantial character is not all made by success at the first attempt, but fully as much by improvement arising from attempts which fall short of their goal. This again is a frequent experience in the affairs of the industrial-arts shop as one day follows another. The spirit of experimentation is a lure to most boys of adolescent age, and industrial-arts work provides frequent and varied opportunity for experimentation in numerous directions.

When thought is given to the question of progress in the whole school system, one may think back to the time when little emphasis was given to anything but academic accomplishment. Later, there appeared the manual activities which took form in industrial arts. More recently, there has come to exist a better understanding of the necessity for still another great factor in a complete education for life, namely, that of mental health. This factor has not been given adequate consideration in the industrial field up to now, nor adequately understood by many school people. When it comes to be known for its real worth, it will be recognized as highly important in all fields of life and education, for it is the bringing together of all other elements in the making of a well-balanced individual. In short, it consists in keeping the individual in the same mental fitness for living that an athlete seeks to maintain for the physical contest.

In the evaluation of industrial-arts education, the discovery has been made that it possesses unlimited possibilities in the direction of making a well-rounded, well-balanced human being. We have gone far from the day when industrial arts was looked upon as essentially materialistic. To-

day, it may be looked upon as a tangible channel for the kind of education which will lead most surely to the healthy mental condition desired for every child.

In the detection of character traits or the summing up of the complete character, all the contributing factors need to be taken into account. This can be done by no technical measuring device. The sum total of a real character and the human interests accompanying it are best shown in the things one does when free to do as he pleases. Such a time may not come frequently in the life of a busy person, but in these days we hear with increasing frequency reference made to the question of leisure time and what to do with it. Leisure time may best be defined, whether one has much or little of it, as the time which may be filled with activity of one's own choosing.

During such leisure time the person who has had part of his education through industrial arts may turn to activities within that field as a matter of choice. In such event he will find first an opportunity for relief from the rush of production. If he has become skeptical because of apparent superficiality in other spheres, he will discover a renewal of the spirit of thoroughness. Failure or discouragement in the world of competition may find a contrast in the opportunity for self-satisfaction over a task well done. Submission to daily routine will fade into insignificance through the fulfillment of the creative desire in some industrial-arts activity. Not the least of the leisure-time values will be found in pure recreation or relaxation through working in material things. Likewise, there will be found the reciprocal value of human truth expressed through the material. The struggle with the material involved, and the final accomplishment, keep one constantly aware of a broader and keener appreciation of the efforts of others and the results of such efforts. Finally, there may be derived within the heart some of the same divine inspiration which the great Master of Life derived through busying His hands as an artisan in wood while His mind was busy in preparation for the Master Life.

In our efforts to continue the progress thus far made, we need not be concerned too much about whether or not we are branded as progressive. A desire to be so labeled may lead to efforts without well-laid foundations and result in mushroom growths. The quest for real progress on the other hand will require constant adherence to certain sound guiding principles. First, we must take account of the world in which we live today. Second, we must compare it as best we can with the world of the past and the possible future. Third, we will need to examine, study, and explore the rich fields represented by the industrial arts. Fourth, we must become acquainted with the needs of boys and girls in preparing for living a complete life in the present-day world. With all these things upon which to build, we are prepared to proceed in utilizing the wealth of resources in the industrial arts toward the end of beneficial participation in schoolwork now, and contribution to constructive citizenship in the future.

Leaving the Crossroads in Teacher Education

Lawrence F. Ashley

Director of Industrial Arts Education, Eastern Illinois State Teachers College, Charleston, Illinois

An excellent article on the education that ought to be given to those who aspire to become industrial-arts teachers.

So much has been said in the past half dozen years, and continues to be said, about "education at the crossroads,"[1] that an impatient public might well fancy the proponents of the phrase as unsuccessful "thumbers" in the stream of educational traffic, assuming that they know where they want to go but can't get a ride. They have left their traditional bandwagons of curriculums and procedures, but hesitate to strike out on foot, if need be, in the direction of the new frontiers.

Terminological Variations

Industrial-arts education (a term coming into use in reference to teacher preparation) has had a hard struggle to reach any kind of crossroad. Its efforts have been so close to the border of traditional jungles that the highway of proper procedures has been obscure and uncertain. Why should this be so? Isn't it pretty plain that a teacher-education program is to prepare teachers for existing situations? What is difficult or mysterious about this? The difficulty is that people do not interpret existing situations alike nor do they agree on what these situations should be. This may be seen in the Warner study where one finds 358 shop and drawing teachers in Ohio designating their work by 28 different terms[2] and in a later study where 21[3] other terms are in use in various parts of the country. This is also seen in the variations in college programs shown in the later study as regards entrance requirements, physical setting, number of minors required, requirement for the major, academic requirements, age levels for various courses, teaching load, institutional policies, and numerous auxiliary features.[4]

What is back of these varying concepts of the teacher's work? Why this lack of agreement? Traditional shop and drawing courses, such as the early manual training in this country, expanded in range as local conditions suggested or permitted, and in accord with the teacher's own empiricisms. The great direction factors which we are just learning to recognize, the cultural, spiritual, and material heritages of the race, together with a philosophy of action built out of them and the present social order, were either unknown or unheeded.

Educational Concepts

Present ideas of education have been developing during five hundred years of public-school experiences and have ever pointed to the criterion "a preparation for living" as the sum total of objectives. This criterion, though worded in more than a hundred ways by writers on educational thought, continues to remain an abstrac-

[1] See Boyd H. Bode. Dr. Bode places himself in the position of an observer in his new book *Progressive Education at the Crossroads*, New York, Newson and Co., 1938, 128 pages.

[2] Warner, William E., *Policies in Industrial Arts Education*, Columbus, Ohio, State University Press, 1928. 86 pp. See p. 5.

[3] Ashley, Lawrence F., *Industrial Arts Education*, Ohio State University Press, Columbus, Ohio. A Dissertation, 1936, 176 pp.

[4] *Ibid.*, See Chapter XIII.

tion to those in charge of programs, and they go blundering along, hoping that what is done will meet the approval of those who must support them. They refuse to look to experts for direction.

Among others, Kilpatrick has done much to clarify thinking about educational programs and summarizes concepts in the following statements which not only validate the industrial-arts program, but give it direction:[5]

To study life and how to enrich it, to study our customs and institutions and how to improve them, to educate youth so that they may grow up socially capable and disposed — these things constitute the aims of any proper educational system.

Further, in *The Educational Frontier*, he explains:[6]

The theory of education should show how life is an active process, grappling always with precariousness and unpredictability, and how learning is inherent in such life and amid such conditions; how learning builds the very structure of the organism; how the individual must always be studied in the larger inherent unity of organism and environment; how thinking is the intelligent interactive adaptation between the novelly growing organism and the novelly developing environment; how living and learning utilize the surrounding social forms and so build these into the very being of the oncoming generation.

Warner has ably shown in INDUSTRIAL ARTS AND VOCATIONAL EDUCATION[7] how accepted concepts analyze into certain objectives, namely, avocational interests, consumer knowledges and appreciations, personal-social growth, desirable-trait development, common technical knowledges, vocational connections, and professional objectives, and how these in turn suggest method and breadth of content.

There is now available to the general public a book of 125 pages in which are incorporated the ideas of ten experts, located in various parts of the country, working with Maris M. Profitt of the United States Office of Education as chairman, and Bess Goodykoontz, Assistant Commissioner of Education.[8] One finds in the foreword statements which align with the Kilpatrick statements already quoted.[9]

The primary duty of our public schools is to provide educational training for citizenship in a democracy. Among the important responsibilities of citizenship is that of participation in the work of the community. Every good citizen is a worker and a producer, whether in commerce, professional pursuits, public service, transportation, agriculture, manufacturing, or other occupational fields. He is also an appreciative consumer who is affected by the intricate interdependence of all occupations. Industrial arts, parallel with other subjects and curriculums and correlated with them, contributes to the realization of the goal of enlightened citizenship.

The public schools, through the grades, should be rich in provisions for pupil experiences (1) which teach the necessity and dignity of work; (2) which illustrate the diversification of industry; (3) which provide for testing personal interests and aptitudes in representative crafts; (4) which serve avocational interests in construction; (5) which develop consumer knowledges and appreciations; (6) which provide occupational training for those who plan to enter employment as industrial workers and for those now in manufacturing trades who desire to improve their proficiency. The first five of these points are served by industrial arts as a phase of the general education desirable for all; the sixth point is the function of industrial or trade education for those who need it as specific training. Industrial arts merges into trade preparation at the time when general education objectives change to specific training objectives.

The Industrial-Arts Field

Wherever principals of schools and industrial-arts teachers have been imbued with these objectives and their significance to the general education of boys and girls, wide experiences with materials and processes are demanded for them in a large general laboratory or in several unit laboratories. This means that the teacher-preparation program must be concerned with a field rather than a subject. The *Federal Interpretations* bulletin calls it a "curriculum area" . . . "comparable in this respect to the language arts."[10] Where a teacher-education program for mathematics consists of courses in mathematics with a core curriculum and a large offering of electives, it is concerned that the major is prepared in the one subject, mathematics. On the other hand, the prospective industrial-arts major must face the necessity for preparation in a variety of subject areas, such as woods, metals, and the like, and must acquire what approaches a journeyman's skill in the processes involved. He must also have an adequate knowledge of philosophy and professional concepts so that he will be able to use his knowledge and skills in a program for various age levels.

Several other considerations are necessary in planning the curriculum part of a teacher-education program. A considerable number of students who want to take an industrial-arts education major in college come with no high-school background of manipulative experiences. Consequently, elementary courses have to be fitted in for them at present, which adds to the laboratory requirement. The mathematics or English major comes with a background of many years in the subject, and upon graduation from college, may take more of the same in the graduate school. The industrial-arts major finds little or no laboratory work on the graduate level and therefore must see to it that he covers most of such needs in his undergraduate experience.

Industrial Arts in Teacher Training

These factors make necessary a seemingly narrow curriculum, for they exclude much preparation in academic courses and limit the subject combinations in which one may be certificated. As a matter of fact, the curriculum is really a broad one because of the wide areas of learning, and additional academic work may be taken in the graduate school. Such a curriculum has recently been approved by the faculty committee in one of the Illinois teacher-education centers. Let us look at it for a moment. One sees at the outset an orientation industrial-arts laboratory course and during the year a beginning drawing course, a bench-woods course, and a bench-metals course for freshmen. They take in addition two American history courses, an economic course, a woods-anatomy course, a hygiene course, three English courses, a short unit in library use, and a year of physical education. Each course lasts twelve weeks and is rated four quarter hours' credit. The academic course represents for the most part, a required *core* for all curriculums.

The sophomores have three courses in machine woods, including furniture plus other construction, and wood patterns, one course in automobile theory, one in sheet metals, and one in household equipment, purchase, installation, and maintenance. They also take two courses in physics, three in principles and educational psychology, and a second year of physical education.

Juniors take two courses in carpentry, a course in architectural drawing, two courses in machine metals, and a course in beginning printing. They also take an additional course in oral English, and three courses in an academic minor.

Seniors carry three courses in practice teaching, and three more courses in their academic minor. They round out their printing with two more courses involving presswork and linotype. They further prepare for the first teaching position with a course in maintenance and a course in general shop.

This curriculum is not the last word in courses for industrial-arts majors, and it seems to be built upon predictability rather than upon existing situations. However, ex-

[5]Kilpatrick, William H., "The Social Situation and the Curriculum," *The Journal of the National Education Association*, Vol. 25, January, 1936, p. 2.

[6]Kilpatrick, William H., *The Educational Frontier*, D. Appleton and Co., New York, 1933, p. 267.

[7]See September, October, November, and December, 1930, issues.

[8]U. S. Department of Interior, Office of Education, *Industrial Arts: Its Interpretation in American Schools*, Bulletin 34.

[9]Written by Bess Goodykoontz.

[10]See paragraph 1 of Introduction.

isting situations have been shown by Potthoff[11] in an exhaustive study for Illinois to be of such a large variety of combinations that they are obviously unsound. One would not want a program to be final, on the other hand, for society is anything but static. The foregoing program does set forth a satisfactory minimum, and is planned so the maximum emphasis is in those areas now most in vogue or rapidly coming into vogue in the public schools. For example, besides the introduction to various mediums in the orientation course, there are six courses, twenty-four quarter hours, in woods; six in the graphic arts, including printing and drawing; four courses in metals, and three general courses ending with a senior general shop. The graduate can also certificate in one academic course of his own choosing in which he will have six courses beyond those required in the core curriculums. Such a curriculum is seen to prepare for teaching a single area in a unit shop or for several areas in a general shop plus one academic combination. Some academic substitutions for shop courses are allowed as individual cases may warrant.

Curricular Offerings at Various Institutions

While the foregoing has been designated as a minimum curriculum, how representative is it of offerings in other colleges? Strange to note, most colleges do not approach it in requirements. Why? There are several factors which control offerings. One of these is the certificating law in whatever state one may be interested. Most certificating laws have not been revised in years and have very inadequate requirements. Yet principals often employ graduates of such curriculums because of their own ignorance of objectives, and such graduates can usually be obtained for less money. A recent study[12] showed that 74.6 per cent of all colleges were influenced by their offerings by state certificating laws; and 65 per cent give a blanket license to teach anything.

Eight colleges show marked differences in conception of what industrial-arts education should be. One finds in the first place that phraseology is not the same, and courses obviously in keeping with those he recognizes as industrial arts are described under different heads.

At least nine colleges look upon the first two years as enough like engineering, that all technical subjects are taught in engineering classes. The outcomes for the students are technical skills and experiences from purely industrial angles and with no reference to public-school work or the needs of the children. An attempt is then made through methods and organization courses to make up for these deficiencies during the senior college years.

One college has a two-year industrial-arts curriculum in addition to the four-year industrial-education curriculum. The latter, as described, is a mixture of vocational work and industrial arts.

One college has a pre-industrial curriculum which in the main is much like that of the engineering colleges. The catalog has this explanation:

> At the end of the pre-industrial education curricula the student may enter the industrial education curriculum proper and normally may meet his degree requirements in an additional two years. If, for some reason, he does not wish to enter the industrial education curriculum at that time, he is free to continue his college work in other directions. This plan of having a pre-industrial education course also makes it possible for a student to attend a junior college or to transfer from other college curricula without missing the essential professional courses that are taught in junior and senior years.

Another college has a series of two-year curriculums in each of the following:

Woodworking, Machine shop, Machine drafting, Electricity, Auto mechanics, Architectural drawing.

Courses in professional training and certain *core* subjects may be added so that the baccalaureate degree may be obtained with a major in a particular area, such as woodworking.

One college has what it terms a "Trade and Industrial Option." There is a single curriculum for the freshman and sophomore years. Then, in the senior college, the work splits and the student chooses between the curriculum which leads to the degree with a major in "trade and industrial education," and the curriculum with a major in industrial arts. The curriculum of another college is like that, except the choice in the senior college must be made between "industrial-arts education," and "industrial administration."

One teachers' college prefaces its industrial-arts curriculums with this statement:

> The following curricula for the preparation of teachers of industrial-arts subjects in the elementary and high schools have been arranged in co-operation with several committees of engineers whose activities have been sponsored by a Chapter of the American Association of Engineers. The courses included in each curriculum and their sequences, together with their rich vocational content, are designed to fit the student for the successful pursuit of his professional activities. A new industrial level of achievement, commensurate with commercial shop practice is attained with the completion of each year's work.

This is then followed with descriptions of several curriculums leading to the baccalaureate degree, each of which is considered as industrial-arts education. First, there is a four-year industrial-arts curriculum with emphasis on architectural courses. Secondly, there is a four-year curriculum in industrial arts with emphasis on building construction. A third four-year industrial-arts curriculum has an emphasis on general shop. A glance at this curriculum shows that apparently *general shop* means to this school a series of technical courses in mechanical drawing, woodwork, elementary electricity, advanced cabinetmaking, carpentry, machine shop, steel square, auto ignition, sheet metal, patternmaking, and radio. Since these courses are offered in different years at different times, one sees no difference between them and curriculums of other schools under the name *unit shop*. This school also has another four-year industrial-arts curriculum with the emphasis on electrical courses.

Because of all of these different conceptions of the problem of industrial-arts education, considerable variation in curriculums is seen in the approximately sixty institutions which grant a degree with a major in industrial-arts education or what is designated as the equivalent. This applies also to the institutional requirements in quarter or semester hours required for a minor as mentioned at the outset. Special professional courses are given by industrial-arts instructors under eleven heads, general professional courses are given by instructors of education and psychology under twelve titles, academic under fifteen names, and technical courses under forty-four titles. The average requirement, though, for any one school is three courses in special professional work, five in general professional, twelve plus courses in technical work, and seven in general academic nonprofessional. One sees these averages as independable criteria for a curriculum because of the meager facilities for technical work in many of the schools. Obviously, if a school has neither room nor equipment, its offerings must be limited. Likewise, if its staff of instructors are short in laboratory training, the offerings must be limited. It is interesting in this connection that in many instances when the director of a limited curriculum was asked if he were satisfied with it, his reply was usually in the affirmative. This was found to parallel his own preparation.

The academic offerings are also affected in schools where there is an engineering emphasis. Too often the whole field of preparation for industrial-arts teaching has been looked upon as a single-subject area instead of viewing it as preparing teachers for several subjects such as woodworking, metal-

[11] Potthoff, Edward F., *Some Factors Which Should Guide the University of Illinois in the Education of Teachers for Illinois High Schools*, College of Education, University of Illinois, Urbana, Ill. July 28, 1936.

[12] Ashley, Lawrence F., *Industrial Arts Education*, Ohio State University Press, Columbus, Ohio, A Dissertation, 1936.

working, the graphic arts, etc., as was previously mentioned. Teachers themselves have not realized this distinction and have permitted their programs to be narrowed to conform to programs for the preparation of teachers in single-subject areas.

One sees here another control of a college program, namely, the local curriculum committee. Still other controls are: The demand for teachers, demands of graduate schools, state boards of education, and university and regional accrediting agencies.

Schools vary in their requirements of minors. The range is from one to four, and the average is one plus. The program suggested at the beginning of this article had room for but one minor, yet it was shown to require but the equivalent of minor preparation (24 quarter hours) in any of its subject areas. Obviously, schools permitting four minors in addition to regular academic core curriculums have but a smattering of industrial arts to offer. Sometimes this situation has been the result of well-intended surveys.

Surveys of Teacher-Education Programs

What has been the effect in general of surveys on teacher-education programs? Too often they have resulted in the discovery of a pattern which has been set up by others and which in turn the discoverer tends to perpetuate. This is seen in surveys of the types of positions which teachers occupy in the public schools in order to give college freshmen educational guidance for ultimate placement. An example is the survey completed by the writer in 1921 (see *Manual Training Magazine* for July, 1921), which showed that 18 per cent of the teachers of *manual arts* taught a variety of other subjects along with shop courses, and another 18 per cent taught technical work and also coached athletics. It was inferred from this that the teachers' college should endeavor to have at least 36 per cent of its industrial-arts majors prepared in athletics and other subjects for certain teaching combinations. Similar surveys have been made for various parts of the country, and teacher-education programs have been set up to conform with the results obtained. This has been quite true in colleges the country over, and is not confined to the industrial-arts situation.

A philosophical view of any of these situations would probably have shown that the industrial-arts combinations existed because somebody started the fashion by taking over two or more areas of work in his teaching position which were suited to his own capabilities or preparation. Is it not likely that the situation has been perpetuated by graduates selecting certain positions because these positions were easier to obtain with a certain minimum of preparation? Strickler's study, showing the reaction of 480 teachers to their preparation, shows how teachers themselves would perpetuate the *status quo*. Each teacher recommended subject matter entirely upon the basis of immediate needs for the particular situation in which he happened to be. These situations show that surveys may be effective program controls and may either cause the *status quo* to persist, or may point out its weaknesses and cause a better program to be set up.

It seems trite to say that any college program needs to have a basis of sincerity that a student will feel no reason to distrust any of the requirements, and equally trite to say that it must have some dignity of bearing. However, the experiences of a teacher who endeavored to get some catalog information by way of a postal-card inquiry leads one to question the programs of some schools. There was such eagerness to get students that the representatives of two schools called upon him to induce him to enroll. Alluring circulars and follow-up letters came from others. Where this was the case, little was said of courses and standards of scholarship. Various ways of appealing to the fancy of the prospective student were used. An example is seen in the following taken from a bulletin of one of these schools: "It pays a teacher to have a degree from ..... College." . . . "Who has not heard of ..... College? . . . Its Opera House will again be thrown open to visitors in another of those incomparable play revivals. Hunt for flakes of gold in mountain streams, gather crystals of amethyst, climb if you wish to the very top of ..... Peak, hike along the mountain trails, whip the pools for rainbow trout, picnic in the pines. Bring the folks along. ..... is vacation land."

Now follows one of several similar letters which were received:

Mr. John Doe

....., ...

Dear John:

I have been checking up on the list of prospective students for ..... College this fall and from information I have received, your name is one that stands out as "tops." It's getting fairly late in the summer and before long, fraternities all over the country will be declaring open season on Freshmen as prospects for pledges.

The ..... figure it's about time a fellow like you received a bit of attention. As a result here is a letter introducing ourselves and also a few illustrated facts about our setup at .....

Enclosed is a date card which is marked with the dates the ..... would like to have with you. We would like to have all of them with you but one day is all any fraternity at ..... is supposed to have. These four dates will give you plenty of time to look our crowd over and after that you should know whether or not you are interested.

The ..... aren't a bad bunch of fellows on any campus and before you make up your mind about this fraternity business we want you to give us serious consideration. We don't want to tell you all about ourselves now. We might spread it on too thick and after seeing us you might think we are a grade "A" bunch of liars.

You can do me a great favor if you will send back the enclosed card so that we will know whether or not and when you will arrive at ..... We'll have the band out to welcome you and really try to make you forget the old home town.

Sincerely yours,[13]

Aside from these lures, there are the inducements of pay in scholarships, in federal grants, and even in athletics. According to a Northwestern professor of journalism,[14] Coach Jones of Oklahoma is advocating that athletes be paid, as is also Dr. Tigert, the President of the University of Florida. Seven schools offer credit inducements of from four to sixty quarter hours for trade experience and ten schools grant from three to nine and one-half quarter hours for teaching experience.

One is not surprised from the foregoing to find that in the description of college-entrance requirements, little is said about the student's high-school rank. Nor is he surprised to find that there are many ways of getting into some colleges.

Because industrial-arts education necessitates scholarship for proficiency and certification, its program must be concerned with all of the activities of the student as well as his curriculum. The many clubs, fraternities, classes, and other organizations such as the school paper and the annual, require the time of many students as officers, presidents, vice-presidents, secretaries, and treasurers. Some of them require business managers, and all of them have committees on which individuals must serve at various times.

Athletic courses are often taken as substitutes for required physical education and claim much time from many industrial-arts majors, not only to participate locally but to attend games away from the campus.

Numerous students work for part of, or all of their expenses while attending school, and in addition participate in some of the activities mentioned. Many schools have as many as 20 per cent on National Youth Administration payrolls, which means that fifty hours of time each month is often taken for work. Students working elsewhere, in restaurants, firing furnaces, and doing many other kinds of work, may put in many more hours than do N.Y.A. students.

The rapid rise of clubs and fraternities, together with other activities connected

[13]Copied from material mailed by two schools.

[14]Martin, Lawrence, "So Pink the Professor," *Esquire*, March, 1936, p. 42.

with student life, has necessitated institutional regulations in order that majors and minors be not slighted, in the seeming scramble to participate in as much as possible. Most colleges now have regulations which limit the student in the amount of his extracurricular activities. One college permits students to hold office in no more than two organizations.

Another control of activity is the granting of honors for scholarship. A student who has pride in scholarship honors knows that he must limit himself to what he can accomplish according to the standard required.

Those who aspire to memberships in national honorary fraternities learn to budget their time and energies in order to meet minimum standards.

Some schools have special departmental clubs for students in various areas of work. Many of these are social clubs and use insignia representative of activity areas in which their special interests lie.

There are in most schools one or more social clubs to which the industrial-arts education major is eligible. Where shall the line be drawn between pure study and social events — or should it be drawn? These are problems which have arisen almost wholly in the present century. They have necessitated special advisers, deans of men, and much extra planning for the program sponsor. An honorary professional fraternity has been demonstrated for many to have leadership values which are inestimable. Some departmental clubs have assigned themselves professional responsibilities and are performing an unquestionable service to their participants.

Conclusion

If teacher education leaves the crossroads, it must launch a program which will not only meet the needs of the *status quo*, but which will represent at least a minimum preparation for the undergraduate in predictable situations.[15] We have been concerned to examine the outlines of such a program for industrial-arts education. We have seen that it must be built upon the premise that it is a program for preparing prospective teachers for a *field* rather than a subject. A sample schedule was given showing that the maximum curriculum offering for a four-year major gives preparation in various teaching areas which is equal to no more than minor requirements in other subjects, and many schools have much less than this required for the major. Programs of other colleges showed varying concepts of industrial-arts education and consequently complicate the problem.

Numerous determiners of policy were noted from the *status quo* in public-school offerings to the most ulterior motives for having a program — inducements for a college enrollment. All of them enter into the general policy of a school or a department and have their bearing upon the preparation of the graduate.

Needless to say, a suitable program is flexible and a shift of emphasis must be readily possible. The present tendency over the country to institute industrial-arts courses everywhere as a basic part of general education compels one to weigh his program repeatedly in the light of new developments in public-school requirements and educational philosophy.

[15] See also in this connection: Ashley, Lawrence F., *Teacher Education for Predictable Situations Rather than Traditional Practice*, Western Arts Association, Vol. XXI, September, 1937.

Socialized Publicity

Glenn O. Wise

Taft School,
Cincinnati, Ohio

Making use of various methods in publicizing industrial-arts work.

The industrial-arts teacher has to publicize himself, because if no one knows of his many fine qualities, his candle may burn undiscerned under the bushel. That is what has been the trouble with many of these teachers. Of course, indirect publicity is the most beneficial. If, by individual effort, one can unobtrusively influence his superiors to write or say a good word about one's efforts, that is indeed a real achievement. If a teacher can get anyone to proclaim his worth voluntarily over a "nation-to-nation hookup," he has achieved the "tops" in press-agenting.

Some efforts at publicity have been very much as the answer of a little girl who was asked "What is your new little brother's name?" Her reply was, "I don't know, we can't understand a single word he says yet." Industrial arts, in too many places, is very much like that little girl's brother. It hasn't spoken so it can be fully understood. It is still much beyond the comprehension of many, and it is frequently not fully understood by those who are dispensing its educational fruits.

Why do some teachers spend money on things that help to publicize their work? Some buy motion-picture apparatus to aid them in their work that costs as much as an auto trip. Others buy printing equipment instead of taking a summer at the lakes. They seem to indulge in "stunts without profit."

Men are very often judged by the stunts they do without profit, such as supervising athletics, being president of the community men's club, and the like. At a certain college, there are two professors who invite their students to a weekly get-together where they eat and play. While these gatherings offer only recreational and social opportunities, it is but natural that the students feel rather kindly toward the work which these professors present during the school term. One of these professors also has the knack of continually seeing good "shots" for those interested in photography. He has developed rare skill in recording events on film and plate. His interest has led him to offer a course in photographic methods which has done much to popularize visual-education methods. His stunts, practiced without apparent profit to himself have still netted him and his profession intangible awards that are practically invaluable.

There are many industrial-arts teachers who are friendly to certain members of the faculty to which they belong and do not even greet some of the others. Why aren't they on friendly terms with the whole teaching force? One of these industrial-arts teachers makes it a practice to report to his principal's office as seldom as possible. He knows few of his fellow teachers by name. When he was transferred to another school, he continued this practice. He complained bitterly that he had difficulties in getting new equipment. What he needed was socialized publicity. His principal and fellow teachers hardly know that he exists, and they know little of his work, dreams, and ambitions. They probably think "Why should we co-operate if he cares nothing about us?" This teacher might well profit by following the advice which a father gave to his boy in these words: "Son, treat everybody politely, even if they are rude to you. You are not showing courtesy to others because they are gentlemen, but because you are one."

The "What I say, do," method of teaching is a practice handed down to us, but the modern educational method is *not* so much of the "do" variety as it is of the variety of "think, plan, and remember what you've done to guide you." If a boy is practicing a good act, let him practice it until it has become a habit, then compliment him and take him to his other teachers or even to the principal to show them the ability which he has developed as a member of your class. Tell his parents and the other children about his accomplishments. It is quite true that the very next day he may blunder, and then he may be strongly criticized, for the teacher has a standard by which to appraise him.

The industrial-arts teacher should ask his supervisor and principal to visit more often than they have done in the past. Then if there is a need for anything, that need can be more easily demonstrated in the shop than in their offices.

Administrative visits, reports and budgets may thus be used to publicize what one's shop needs. A superior wanting a very special job done may be informed that a certain other school in the system has just the machine or tool to do the job right. Either that tool is then sent for or more often a new one is ordered for the shop where the work is to be done.

Publicity is a great help but it must be truthful, informative, and interesting, and it must hold the attention long enough to make an impression.

Schools have become a highly technical development. The industrial-arts teacher is the technical interpreter of his work to the school system which employs him.

The check sheet shown herewith may be used by the teacher to determine for himself how many methods of publicity he is utilizing to interpret the industrial arts to his community.

CHECK SHEET FOR INDUSTRIAL-ARTS PUBLICITY

Check (✓) the following according to your use of the publicity methods indicated and also note their value in your estimation. If you do not use the type listed, check only estimated value.

O - Occasionally F - Frequently N - Not at all

W - Worthless A - Average E - Excellent

	O	F	N	W	A	E
1. Administrative visits						
2. Auditorium sessions						
a) Participated in by entire school						
b) Prepared and presented by industrial arts dept.						
c) Presented in conjunction with another dept.						
3. Exhibits in						
a) Community centers						
b) School						
c) Shop						
4. Hobby fairs sponsored by						
a) Community						
b) Industrial-arts department						
c) Parent-teacher association						
5. Industrial-arts publications						
a) Newspaper edited and published by industrial-arts pupils						
b) Industrial-arts column or page in school publication						
c) Information sheet prepared by instructor and sent home with pupils (form letters, etc.)						
At regular intervals						
Occasionally						
d) Information sheet prepared by instructor and given shop visitors						
6. Instructor visiting days						
a) Visit shops in your own school system						
b) Visit industrial-arts departments in neighboring cities and states						
7. Moving pictures						
a) Taken in industrial-arts department shown in Community club entertainments (chamber of commerce and others)						
Local theaters						
Neighboring communities						
Newsreels						
School (public invited)						
b) Taken regularly in industrial-arts department and exchanged with						
Other departments						
Other schools						
8. Newspapers						
a) Articles written by instructor						
b) Articles written by pupils						
c) Pictures of worth-while activities, projects, etc.						

	O	F	N	W	A	E
9. Patron visitation						
a) Father's night						
b) Father-and-son night						
c) Open house or parents' night						
d) Parents and friends visit the shop whenever they wish						
e) Time specified by instructor (class time)						
10. Posters prepared by pupils for						
a) School corridors						
b) Store windows and theaters						
11. Pupil exchange						
a) Shops in same school system exchange pupils for from four to six weeks						
b) Industrial-arts departments in neighboring communities exchange pupils for from four to six weeks						
c) Exchange pupils with industrial-arts departments in other states for from six to twelve weeks						
12. Pupil visitation						
a) Individual pupils visit for one day						
b) Individual pupils visit a shop weekly						
c) Class visit for one shop period						
13. Radio						
a) Talks sponsored by civic clubs						
b) Talks sponsored by school board						
c) Class visit for one shop period						
14. Reports to						
a) Principal						
b) Supervisor						
c) Others						
Annual						
Daily						
Monthly						
Weekly						
Others						
15. Slides, lantern						
16. Teacher contacts						
a) Opportunities for academic teachers to visit shop						
b) Civic clubs						
c) Hold civic-club office						
d) Men's clubs (rotarians, etc.)						

Publicity Definitions

Terms are sometimes confusing unless they are definitely defined. Those relating to publicity are hereby given so that the person using the check list may understand the terms used.

Advertise: To make public, usually in printing, or radio broadcasting; to call to public notice.

Appreciate: To realize the values of truthfulness, goodness, or beauty in an article, representation, or statement; the realization of characteristic worth.

Diplomacy: The art of securing a desired objective without incurring animosity; possessing tact in conducting affairs.

Exhibit: To show publicly for the purpose of competition or demonstration; to display.

Publicity: Information intended to arouse interest, usually appearing in print.

Publish: To divulge, announce, proclaim; to bring before the public.

Propaganda: An organized effort to spread particular doctrines, information, and the like.

Shibboleth: Criterion, standard, test, watchword.

Show: To reveal, to make known, to explain something, to teach, to instruct.

Understand: To grasp the purpose or meaning of words, signs, information, or explanations.

Education does not mean teaching people what they do not know. It means teaching them to behave as they do not behave. It is not teaching the youth the shapes of letters and the tricks of numbers, and then leaving them to turn their arithmetic to roguery, and their literature to lust. It means, on the contrary, training them into the perfect exercise and kingly continence of their bodies and souls. It is a painful, continual, and difficult work to be done by kindness, by watching, by warning, by precept, and by praise, but above all — by example. — *John Ruskin.*

An able man shows his spirit by gentle words and resolute actions. —*Chesterfield.*

I read, I study, I examine, I listen, I reflect, and out of all this, I try to form an idea into which I put as much common sense as I can. — *Lafayette.*

Men do less than they ought unless they do all that they can.— *Carlyle.*

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

J. J. Metz, Editor

Social Studies and the Shop Teacher

Much emphasis is placed today by educational writers on the value of the social studies in the school curriculum. In many systems, the social studies have been given the status of a separate course and some very well developed outlines of study are obtainable.

According to a recent study, the social studies purpose to give to the pupil (*a*) "the truest and most realistic knowledge that is possible of the community, state, nation, and world — the social and physical setting in which they live and make their way; (*b*) preparation for promoting the wiser and more effective co-operation among regions, areas, individuals, groups, communities, states, and nations — a co-operation international, interreligious, and intereconomic; (*c*) . . . a love of truth and appreciation of the beautiful, a bent toward the good and a desire and will to use knowledge for beneficial ends; (*d*) training in the intellectual process indispensable to the functioning of society."

From the foregoing it is quite evident that the social subjects cannot be outlined with the exactitude of a science. There is much overlapping between these subjects and those commonly found in the curriculum. Human relationships which form the basis of social subjects have been the cause of dissention and discussion since the very beginning of the human race. There will be no absolute unanimity on the question of what should be included under the heading of "Social Subjects," or where the emphasis should be placed, or what position is to be taken on controversial issues which have been discussed since the dawn of civilization. Differences of opinion will continue, and this fact must be reckoned with. Of course, some will argue that industrial arts and vocational education presents a separate area in the general field of education which has so many problems of its own that it ought not to concern itself with other subjects. Convenient as this viewpoint may be leaders of industrial arts and vocational education cannot and will not take this view, knowing that their field so intimately contacts the social studies that they may not be ignored.

As a matter of fact, it is difficult to consider how industrial-arts and vocational subjects could be presented without pointing out the place they are to occupy in the future life of the learner. It seems as though it were a matter of necessity that the work in school shops, yes, even the atmosphere in that shop, be a reflection, even though weak, of the industrial life of the community, if not of the nation. It is equally difficult to understand that other social relationships which are the very basis of American industrial and social progress, such as co-operatively working together on a common undertaking where each individual adds his quota in the production of the whole, are or at least have been frequently overlooked in the presentation of industrial-arts and vocational subjects.

The very foundation of the production system which has made possible the common enjoyment of so many conveniences and labor-saving devices which were totally unknown to our forefathers, seems to point to the fact that our future workers must be thoroughly familiarized with the necessity for co-operative endeavor.

It seems equally plain that the student of industrial arts and vocational education should acquire a good historical picture of the rights and growth of our industrial civilization. This historical study may and does picture man as a part of nature in the raw, just as any view of history will picture him if it reduces events to their lowest terms. Frequently a captain of industry who is held up to our admiration, if carefully studied, is shown to be a cruel, dishonest barterer in human souls. The highly successful businessman and financier very often are unmasked as men who deliberately mislead others in order to rob them of their money. Frequently, too, labor leaders are found who have feathered their own nests at the expense of their followers.

All history discloses these sordid aspects of humanity. All written history discloses the common characteristics of its human authorship. Each writer consciously or unconsciously colors his story according to his own viewpoints or prejudices. One writer depicts a given character in glowing colors as a benefactor of humanity, while the next pictures him as a scheming, dishonest scoundrel. In the one book, all businessmen and industrialists are portrayed as hardhearted, crooked money grabbers, while those who work for wages are pictured as saintly martyrs. Another book, written with equally vivid colors, shows the workingman to be a lazy, improvident loafer who defrauds his employer, and who slyly but steadily works toward the destruction of capitalism by practicing sabotage whenever occasion offers.

With such conflicting information at hand, industrial-arts teachers will frequently have trouble in helping their students get an unbiased viewpoint of the social relationships which they inevitably will encounter in their later life as employees or employers in an industrial democracy. It will take calm judgment and deliberation to steer these young minds through the dangerous reefs of false notions engendered by the bias of their elders. Yet, this is the problem with which the teacher is confronted.

How, then, can he master this difficult task? Naturally, the first thing for the individual teacher is to get his own social outlook adjusted. Personal, narrow, and biased viewpoints on any and all of the many disputed points must be carefully straightened out. He must take care that he himself thinks straight on the matters he is to present to his pupils. He must not be influenced by the ever-present pressure groups in politics, in labor circles, in employer groups. There must be no wavering in pointing out what is right and just; there can be no favoritism shown, no condoning of wrong when performed by the group to which one belongs, or to which one may be naturally attracted.

If American democracy is to be saved, every student must be trained more and more to think and work for the common good, rather than for individual preferment and advantage. There can be no admixture of communistic and fascistic doctrines with the subject matter presented. The worker of tomorrow must learn that he has definite civic duties. He must be taught that there are duties, rights, and responsibilities on both sides of the employer-employee relationship, and that a

wrong committed on one side cannot be corrected by a wrong committed in retaliation on the other side. Underpaying and ill treating a worker is a serious wrong which cannot be righted by the destruction of an employer's property or by taking the lives of those who seem to side with him.

The common idea that one can defraud a large public service corporation without wrongdoing must be combatted, while the student at the same time is taught just what the responsibilities and duties of those who conduct these huge business enterprises are in relationship to their employees and to the public which they serve.

The social studies must not be viewed merely from the academic viewpoint. Their practical application, difficult as that may be, must be clearly demonstrated both in word and indeed. The instructor, therefore, in his own position as employee must be exceedingly careful to use ethical and professional means to straighten out difficulties which may arise in his own workaday relationship with his superiors and his board of education.

His life must be a true exemplification of the social studies which he presents to his students.

Do We Train the Hands Only?

Recently a writer in a letter to the editor of a local newspaper made use of the rather silly but oft-repeated objection to that part of general education which is embraced by industrial arts and vocational education. "It seems," he writes "to be the aim of certain educators to train the hands and not the mind." Unfortunately, these general statements are so commonly made even by the better educated that they do much harm to the cause of industrial arts and vocational education. Unfortunately, also, teachers of industrial arts and vocational education too frequently see only the manipulative side of their work, and in that way give some weight to these charges.

To any thinking man, neither industrial arts nor vocational education can possibly be training of the hands alone, and anyone who knows anything about some of the more skilled work for which training is given in our part-time and full-time vocational and technical schools, would never dare charge that the students receiving training are taught hand skills only. Yet, these oft-repeated charges point out clearly a certain trend of public opinion. They show that the school has frequently overemphasized the narrow utilitarian objectives of the work being offered in the fields of industrial arts and vocational education. Likewise, when showing the work produced by students, they have emphasized too much the skill that was required, forgetting that the outsider might not see the connection between the finished object and the planning that was required before the work could even be started.

It is well then, for teachers of industrial arts and vocational education to bear this phase of their work in mind when they plan their publicity work and their exhibits for the public They must show that the work performed by the student required not only skillful hands but also well-trained minds to design, make the required calculations, choose suitable materials, and plan the procedure before producing the exhibition piece which may have misled some into thinking that industrial arts and vocational education merely trains hands and leaves minds dormant or empty.

Timely Thoughts

R. Randolph Karch in this issue presents in an interesting but thorough manner just what the printshop teacher must do in starting his work for the new year. This article is directed to teachers of a special subject, it is true, yet it may be profitably read by every shop teacher.

Getting the shop in readiness is the first item to which attention is called. This applies to every school shop, no matter what the subject that may be taught in it. It is important that the shop present a workmanlike appearance to the entering student. First impressions are powerful and it is important that they be good.

The paragraph on installation of new equipment may not apply to many shop teachers. The past eight or nine years have caused some shop teachers to forget that there is such a thing as new equipment, but there are still some who are fortunate enough to be confronted with this arduous if interesting task. Even if there are many who need not consider this part of the work, yet they will be confronted with the task of checking over the equipment that is already installed. Of course, many may say "I know my equipment so well that I need not bother about looking it over now." Nevertheless, it is better to do so anyway. If it is in good condition, the checkup will not harm it, while if some flaw or other has developed over the summer, there may still be time to put things in readiness for the opening day.

Then the article refers to the establishment of a stock inventory. This idea may not appeal to many. However, it is a worth-while suggestion which may forestall much labor and trouble in the future.

Another valuable idea is discussed in the paragraph on cleaning up. Of course, the method of taking care of this phase of the work may differ materially in various types of shops, but it must be considered, and now is the best time to plan it carefully.

Assigning work and working areas is another section in Mr. Karch's article that may well be pondered on. Being prepared is being forearmed. What if the entering class on the first day of school is larger than before? Can the additional students be accommodated? What will the teacher do with them? Now is the time to settle these questions, then the problem will not be troublesome when it arises.

Course materials and tests, accident and health hazards, handling production, class scheduling, graphic rating plans, are all items that have been discussed in Mr. Karch's "How to Start Out a Printshop Class." They find application in every other type of shop class as well. There is ample time to think about how they affect the class of the individual reader. It is well to have solutions for every one of these problems that may arise at any time in the coming year.

Some instructors may be sufficiently interested in the various items mentioned to refer back to articles which have appeared during 1937 in INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. References to these articles are, therefore, given.

Competition in Keeping an Orderly Shop, 415, December; Operation Sheets Prepared by the Student, 280, September; Perpetual Shop Inventory System, 104, March; Production in the School Shop, 412, December; Progress Chart for the Millroom, 270, September; Reminder for the Shop Teacher, 260, August; Safety Rules and a Pass Card, 388, November; Self-Assigning Clean-Up Chart, 257, August; That Tool Problem Again, 96, March; Tools Stored Where Used Best, 261, August; Work Plan and Individual Progress Card, 103, March.

The Evolution of Printing

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An excellent sketch on the history of printing, type casting, paper-making, ink making, and the invention of the printing press.

Historians who credit Johannes Gutenberg, of Maintz, Germany, with the invention of printing, about the year 1435, erroneously assume that the art sprang into being through the efforts of one man. Those who claim for Lourens Coster, of Haarlem, Netherlands, the invention of movable type, commit even a more serious mistake. Gutenberg most certainly should be honored as the man who initiated the great movement which resulted in the spread of printing throughout Europe, and Coster is doubtlessly deserving of passing mention in the history of printing. However, printing was in the process of development for hundreds of years before either of these men was born. Printing, like many other forms of the graphic arts, became a part of civilization through a process of evolution. The antecedents of the Maintz experiment were extremely important in the evolution of printing.

Gutenberg and his immediate successors were interested in the printing of books modeled after bound manuscripts. Manuscripts folded in sheets like books came into existence about A.D. 200 to 300. These folded manuscripts may not have been bound as books when they were first used, but there is evidence to indicate that manuscript binding was well established by the eighth century.

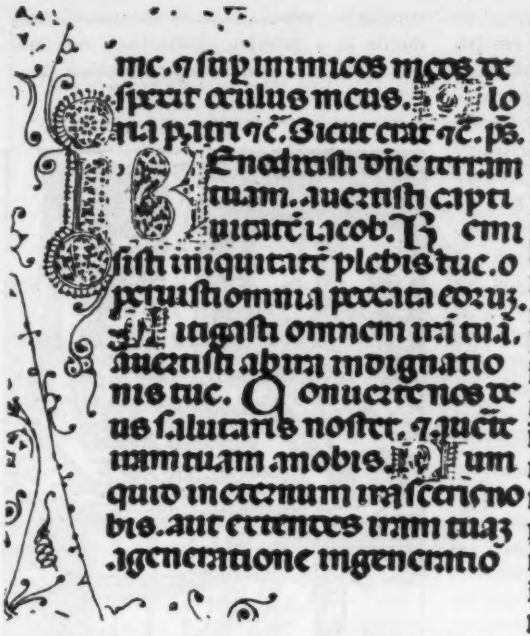
Handwritten scrolls were forerunners of folded manuscript books. Scrolls of papyrus were used by the early Egyptians. Ptolmey I founded a library in 300 B.C. in which scrolls were stored and cataloged in somewhat the same manner as books in libraries of modern times. The early Greeks and Romans also used scrolls but these were more frequently made of vellum or parchment. At first the messages or records on scrolls were written across the sheet but gradually the writing was placed on the scroll in separate sections or pages running lengthwise. This change made the reading of the contents more easy and paved the way for the introduction of folded manuscripts.

Bound manuscripts were really hand-lettered books. These books were produced in the Middle Ages by scribes who were members of religious orders. Since such men dedicated their lives to the work of producing manuscript books, marked skill naturally was developed, and remarkably beautiful documents were not uncommon. Many were illustrated by hand-drawn designs and sketches, and some were profusely ornamented. The inscribing of large, decorative initial letters in color at the beginning of paragraphs was a favorite method of enlivening the appearance of manuscripts after about A.D. 600. By the end of the fourteenth century, manuscript writing had become a fine art in Europe. It is not unusual, therefore, that early printed books were imitations of famous manuscripts.

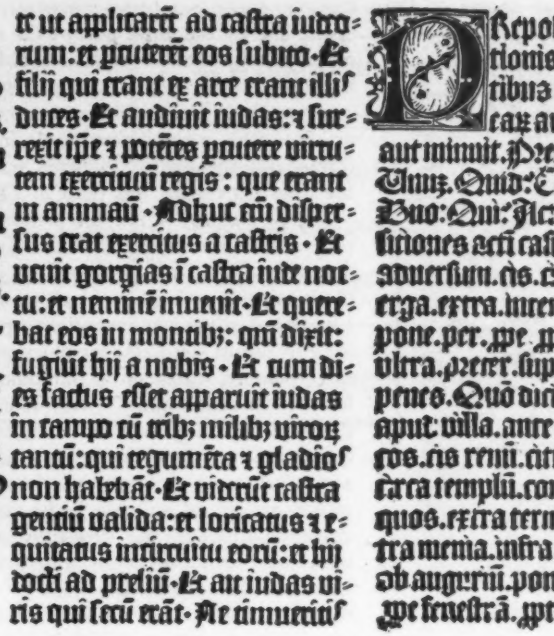
It has frequently been contended that the printing of books from engraved wood blocks was the natural step between manuscript books and those later printed from movable types. Printing from wood engravings is known to have occurred in Japan as early as A.D. 770 and there is some foundation for the belief that the process originated in China about A.D. 400. The art of printing from wood blocks flourished in the Orient for several centuries before being introduced into Europe. One of the most pretentious block-printing undertakings, the production of the Confucian classics, was completed in China in 953: a task that required twenty-one years of labor. Single-page block prints, presumably produced in 1418 and 1423 in Germany, are in existence today, but the oldest known European block-printed books were produced in 1450. Gutenberg printed from wood blocks in a small way, therefore, it may be that his work in this connection impressed him with the possibilities of printing from movable type. In general, however, it would appear that the making of books from engraved wood blocks developed in Europe side by side with typographic printing, for the majority of the early block-printed books are dated after 1470.

In making possible the transition from hand-lettered manuscripts to books printed from type forms, Gutenberg and the other early printers needed: (1) A supply of single letters cast in type which could be assembled to make words; (2) a method of locking the type into a solid form; (3) a surface such as paper to receive the impression; (4) an ink to register the impression of the type on the paper; (5) a method of bringing the paper and type form

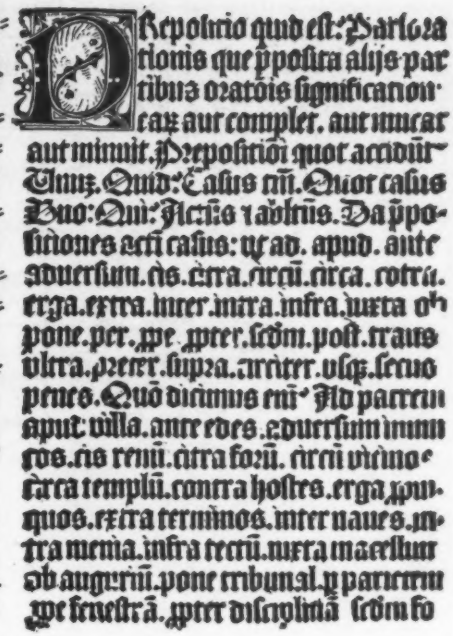
Reproduction of page from "The Diamond Sutra," the world's oldest known printed book. Printed by a Chinese, Wang Chieh, from wood blocks on sheets of mulberry-bark paper, and pasted into a continuous roll. Original now in British Museum. Printed in A.D. 868.



Reproduction of page from German manuscript book. Hand-lettered manuscript book produced in the latter part of the 14th century. Note resemblance of later block print and movable-type letters



Reproduction of page from 36-line bible. Bible printed with Gutenberg's types about 1458–61. Note resemblance to manuscript face



Reproduction of page from German block-print book. 15th century block print. Note resemblance to manuscript face

together under pressure. In one manner or another, all of these needs had been met long before Gutenberg began his experiments.

Printing from movable types may have been new in Europe in the fifteenth century, but such a method had been used in earlier years in China and Japan. It is now generally conceded that the use of separate characters in printing was invented by Pi-Sheng, a Chinese, between the years 1041 and 1049. His types reputedly were cast in porcelain and were not wholly successful. In 1314, Wang Cheng, another Chinese, published a description of a method of printing from movable wood types locked in a chase in somewhat the same manner as that used today. Type cast from metal in Korea in 1392 was widely used in China and Japan; and in 1403, the King of Korea established a foundry for casting type in bronze. Just how commercially successful the printing from separate characters was in the Orient is not known. Some investigators insist that there would have been little advantage in using this method of printing in a language such as Chinese which requires some 30,000 separate characters. Yet the fact that such printing was done is not denied. Since it is known that block printing was learned from the Chinese, it is conceivable that Europe may also have learned the use of movable types from the Asiatic people.

Did Gutenberg know about the use of movable type when he turned his attention to the problem of printing religious literature as a commercial venture? The use of type in China and Japan may not have been known to him but the use of molds and punches was known to him through his occupation as a lapidary and silversmith. The casting of metals was commonly understood by men in his calling. The use of separate letters in embossing, stamping, and inlaying of title lines on bindings for manuscript books was most certainly a procedure with which he was acquainted. The idea of printing with movable types was a natural conception for him to develop.

Saint Christopher woodcut. Produced in Germany in 1423. May have suggested the use of movable types to Gutenberg since he is known to have been interested in block prints in a commercial way before attempting bible printing

Did Gutenberg discover the principle of the printing press? Probably not. Presses were used for various purposes in his time. They were used for domestic purposes in the making of wines, and for commercial purposes in bookbinding and papermaking. The press was not new but its use for printing was probably original because historical investigations fail to reveal any use of a press for printing purposes prior to Gutenberg. The Chinese and their European followers employed the planer method, hand-and-block, and secured an impression on but one side of the sheet in making prints from wood blocks and other relief surfaces.

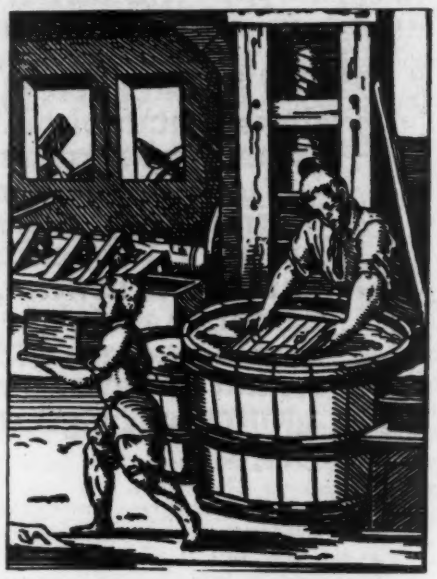
Paper and printing ink were not new when Gutenberg began his work. Paper is known to have been made in China from tree bark, rags, and fish nets in A.D. 105 by one Ts'ai Lun. However, the process of papermaking was discovered about two hundred years before that date. Paper was used for many purposes by the Chinese, and was being extensively manufactured by the eighth century. Even the process of sizing or coating for the purpose of making the paper more opaque or producing a

more desirable surface was known to the early Chinese papermakers. By the eleventh century, paper was being manufactured in Spain, and by the latter part of the twelfth century, paper mills were established in France. A hundred years later, paper was being made in Italy and Germany. Papermaking was a well-developed industry throughout the known, civilized world by the time Gutenberg was born in 1400.

Early oriental papermaking. Illustration from an early Japanese book showing the formation of a sheet of paper by dipping a mold. This was probably the method used by the first papermakers in China

In the making of ink for printing purposes, the Chinese also led the world in discovery. Wei Tang perfected an ink for block printing, using lampblack as early as A.D. 400. Viscous inks essential to printing were in use in Germany for block printing and stamping titles on bookbindings before Gutenberg's time. Paints somewhat similar to printing inks were also used by artists at that time. Doubtless Gutenberg and other early printers experimented to secure an ink of suitable body and consistency, although the pigments and vehicles for such inks were widely known. Interestingly enough, the inks in use by printers until recent years were, in general, quite the same as the inks used by fifteenth-century pioneers in printing.

The early history of type, paper, ink, and presses has been outlined to show how a new commercial process grows out of existing mediums. To Gutenberg we must attribute the envisionment of the commercial and cultural possibilities of printing as a process of graphic reproduction. To the cumulative effect of the inventions of many minds in a growing civilization, we must attribute the evolution of printing as a graphic art.



Early European papermaking. Woodcut showing the formation of sheets of paper about the time of the invention of printing from movable types. Note the press in the background and its resemblance to early printing presses

Obtaining Occupational Information

Clifford K. Lush

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A method of enlisting the aid of the students in obtaining first-hand occupational information.

Since industrial-arts instructors teach a subject which is so full of guidance information possibilities, they are often asked to take over the occupation classes, or even the guidance work in their local schools. If the school does not employ such a specialist, and the industrial instructor happens to be the most qualified of the local staff for the service, he should assume the duties, provided he is given special time for the work by being relieved of other responsibilities.

It is apparent that chance plays all too large a part in the individual's selection of an occupation. Attempts to acquaint students with many occupational fields about which they know nothing, or very little, will eliminate a part of this haphazard selection, and no doubt lessen the number of occupational misfits to make for a better, more efficient, and happier civilization. Therefore a guidance specialist should have at hand a great deal of reliable occupational information in order to present fairly a broad picture of the working world.

The student considering a certain occupation usually wishes to know these facts: the preparation required; the way to get the job; the advantages and disadvantages; and the earnings he may expect. This need for specific information about the common occupations prompted the author to develop a system of gathering information from the workers themselves, by devising a method of collecting such data in schools, without an expensive occupational survey.

Students who are studying occupations in their community civics classes take a mimeographed sheet of questions concerning various jobs to their fathers, sisters, brothers, uncles, or other relatives and friends. They interview these working people, either asking the questions and writing the answers, or allowing the people themselves to fill out the blanks. No names are signed except by the students who turn in the papers, because it was thought that the answers, especially relating to salary, might be more exact. Extra credit in civics is given the pupils as an incentive to assure return of the questionnaire, the answers then being copied or printed on 3 by 5-in. file cards (See Fig. 1) to make the information more easily available.

Since teachers have had an opportunity to gather occupational information from several fields or from contact with friends and relatives, they can furnish a valuable addition to this card index by filling out cards themselves. For example, the junior-high-school teachers should be able to supply information on occupations directly relating to their subjects, as outlined in the following list, the purpose of which is to "tie up" the courses with the future life of the students.

1. Art

Name of Job, (as machinist, barber, etc.) City and state	How did you get this job?
Where do you work? (Name of the firm)	What personal qualities should one have to be a competent worker in this field?
What is the nature of the firm, (as mfg. butter tubs: Small bank)	What is beginning Salary? The average salary?
What type of work do you perform?	What are some of the advantages in this work?
How long have you done this type of work?	What are the disadvantages?
Is the work considered steady? Explain.	What is your hobby?
What training or schooling have you had for this job?	Have you any comment to make to students who would like to be in this type of work?
OCCUPATIONS CARD (over) Sex_____ Date_____ No._____	

Fig. 1. Front and reverse side of the occupations card

Advertising and commercial artists, painters, sculptors, etc. Industries using specialists in art.

2. Commercial Subjects

Stenographers, accountants, secretaries, bankers, retail and wholesale merchants, etc.

3. English

Dramatists, journalists, playwrights, etc. List books and novels picturing occupations for book reports, themes, and reports. Interviews and subsequent reports, etc.

4. Foreign Languages

Vocations related to each subject (medicine to Latin, etc.).

5. General Science

At the close of the unit, it is suggested that an outline be made by each student on an occupation related to that particular unit, such as astronomy, botany, zoology, agriculture, construction, transportation, communication, etc.

6. Geography

A study of the occupations of the state or city which may be mentioned in the class text. Geology and navigation are interesting fields.

7. Home Economics

Factory labor in related fields: power-machine operators, milliners, chefs, dietitians, bakers, etc.

8. Hygiene

Practical and registered nurses, physicians, pharmacists, hospital technicians, etc.

9. Industrial Arts

The various specialized occupations under each industrial subject, such as: binders, compositors, machine operators, stonemen, make-up men, proofreaders, and copy writers, which are related to printing.

10. Mathematics

Engineering in all its branches, architecture, trade, accounting, etc.

11. Music

Vocal: Opera and stage, church music, choral societies, etc. Instrumental: Symphony artists, members of miscellaneous orchestras, bands, radio and movie artists.

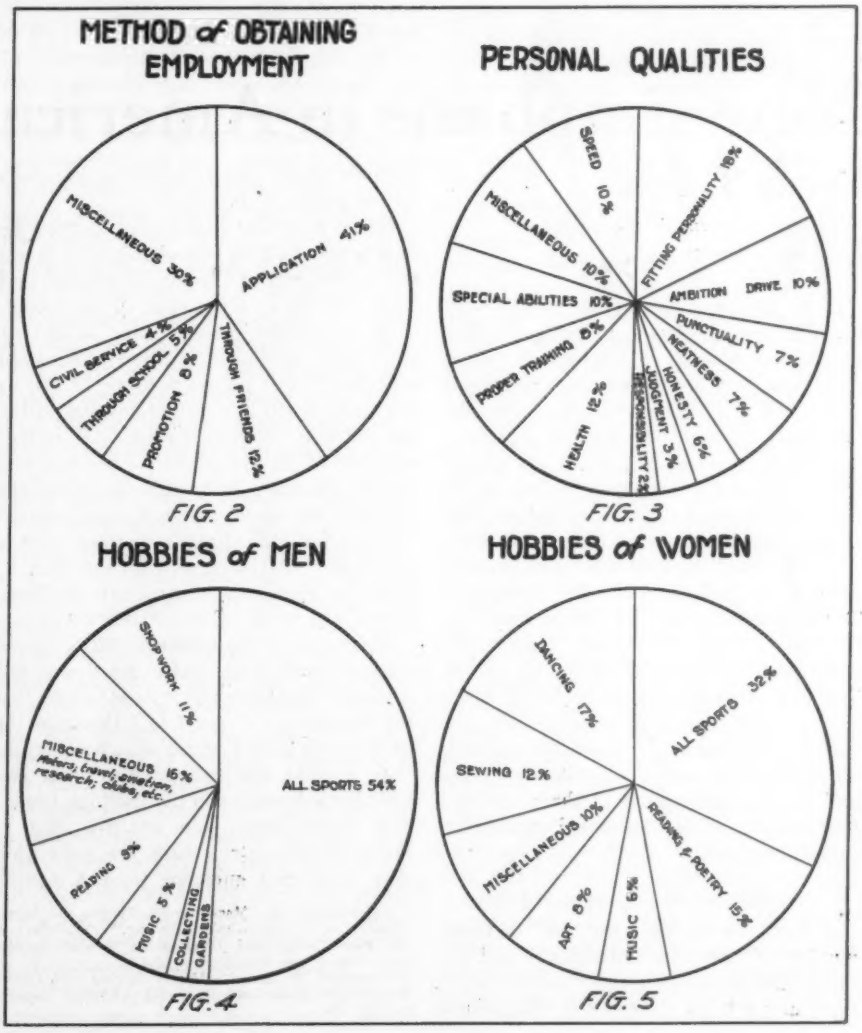
12. Social Science

Most present-day social civics books give excellent suggestions for related occupations. Civil-service jobs, as government clerks, mailmen, policemen, etc., should be included; political affiliations for political offices and employment; the army and navy as vocations, etc.

Both junior- and senior-high-school teachers should also fill out cards concerning occupations *unrelated* to their subjects, provided they feel themselves sufficiently informed to offer accurate information. In this way a fair-sized index may be obtained to start the project.

Feasible for Small Communities

These cards may be used also in a small community where the range of occupations is rather narrow, by having the students



mail the questionnaire to relatives and friends working in other communities and representing occupations not locally common. Exchange of duplicate cards with teachers in other communities is also practical.

As a file of cards is built up, it will be found necessary to establish a system of classification so that only those cards of particular interest to a given boy or girl will have to be studied. The reference list included will offer a great deal of information concerning the construction of such an index and the precipitation of the facts secured.

The Use of the File

The completed file is used by the counselor to great advantage during the private interview. He selects for the student a packet of cards directly relating to the field of interest which give the varied and often conflicting viewpoints of many people who are actually working at that occupation. Students show a great deal of interest in reading these and always discover something they did not know before. It is here that the value of the cards is exhibited, because of the interest of the pupils in learning certain facts which frequently bring about a complete change in educational and vocational plans. They may also serve as excellent supplementary material for the classes in civics or occupations.

Not until all departments of the junior and senior high schools contribute their share of such occupational information is it possible for a school administrator to feel that his institution is achieving the general objective of furnishing guidance information.

Regardless of absolute statistical reliability, the data compiled from several thousand cards filled out by employed people in Minneapolis are very interesting. Figures 2, 3, 4, and 5, for example, show the proportionate methods of obtaining employment, personal qualities believed necessary for success, and the hobbies of men and women.

References

Bennett, Wilma, *Occupations and Vocational Guidance*, H. W. Wilson Co., New York City.

Cisney, Harland N., *The Classification of Occupations in Terms of Social Intelligence, Artistic Ability, and Musical Talents*, an Unpublished Thesis, University of Minnesota.

Fryer, Douglas, "Occupational Intelligence Standards," *School and Society*, 16:273–77, 1922.

Occupations, United States Bureau of Census, Washington, D. C.

"One Hundred Books: A Library on Occupational Adjustment," Occupations — *The Vocational Guidance Magazine*, February, 1935.

"Psychological Examining in the United States Army," *Memoirs of the National Academy of Science*, 1921, XI, Part III, Chapter 15, pp. 819–37.

Recent Social Trends in the United States, Chapter VI, "Occupations," McGraw-Hill Book Company, New York City, pp. 268–324.

Vocational Guidance and Junior Placement, U. S. Children's Bureau, U. S. Government Printing Office, Washington, D. C.

New Emphasis in American Education

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Pointing the way for vocational education to assume its share in modernizing the education needed by present-day and future Americans.

Little insight is needed by reflective lay and educational groups, to recognize that a significant change of emphasis is taking place today in our American educational system. We have been disposed through tradition to accept the existing social order. We have been content to accept the basic democratic principles contained in our Constitution, as though settled for time eternal. We have accepted the implication that our chief work in education was to prepare the individual for the *status quo*. The first automobile had a whip socket on its low, dumpy dashboard, though the horse had been supplanted by an engine. The ever-increasing social problems which confront us when compared to the advancing educational costs and the astounding growth in school enrollments make one hesitate to wonder if there are still whip sockets on the dashboard of our educational system.

Mental Maladjustment

It has been felt by many that the tragic number of mentally maladjusted and the rapid increase in delinquency and crime are due, in part, to compulsory educational methods which thwart youth of its idealism of personal integrity.

Haven Emerson[1] reports that in 1928 the experience of 62 juvenile courts in 15 states and the District of Columbia indicated that about 33,000, or 1 per cent, of the school-child population, seven years of age or older, were delinquent. Further, it has been estimated that 1 person in every 22 will be institutionalized in a mental hospital within the life span of a generation. Still further evidence of the prevalence of nervous and mental disorders is brought forth by the fact that the suicide rate has risen from 4.9 to 19.7 for each 100,000 persons over a a period of 70 years, and in less than 50 years the rise in the divorce rate has been from 26 to 68 for each 100,000 persons.

In answer to the question, "What is the implication of these data in relation to our schools?," M. Ernest Townsend[2] shows that the chances are almost 7 to 1 that over the twelve-year period of public-school education, a child will encounter at least two maladjusted persons in the teaching profession. These figures point out that, first, in every school system there are some children who need guidance from a mental-hygiene point of view, and, second, they indicate the need of selection, guidance, and training in our colleges in order to eliminate the students who are mentally ill from continuing their professional training until they have become employees of the public schools. We have allowed an educational philosophy to surround us which subordinates the individual to the program or system. Hence, the weaker submit, perhaps later to become mentally maladjusted and behavior-problem cases, while the stronger rebel and become antisocial and the same behavioristic problem cases.

However, we are beginning to accept the fact that our former educational beliefs and attitudes must be changed, reorganized, and reinterpreted to meet the needs and demands of contemporary living.

Upon education depends the real hope of a continuance of the principles of Amer-

[1]Emerson, Haven, "Magnitude of Nervous and Mental Diseases as a Public-Health Problem," *Proceedings of the First International Congress on Mental Hygiene*, 1932. Vol. I, pp. 209–228.

[2]Townsend, M. Ernest, "Mental Hygiene and Teacher Recruiting," *Mental Hygiene*, Vol. XVII:4. October, 1933, p. 600.

ican democracy. Our forefathers foresaw this important ideal and expressed themselves in favoring education for all. In the years that have passed, America has become a great industrial nation. At present it is in an era of large-scale corporations which control over 50 per cent of the assets of the manufacturing concerns in the United States.

Educating the Pioneer

Our educational system, which was admirably adapted to our former pioneer civilization of rugged individualism, has not kept pace with the changing economic and social order. In the early days, education succeeded in aiding the American people to conquer the hardships of the frontier which with its virgin lands presented opportunities to all who would partake.

John Dewey has said "The only sure thing we face is change." But we must admit that education today has not changed sufficiently for the youth of the nation to conquer the new frontiers, namely, economic instability, unemployment (including technological), political preference, selfish exploitation, and social and moral upheaval. To conquer these, we must make liberty, equality, and brotherhood real — something more than mere slogans.

Education for centuries has been organized outside the interests of the child. The contribution of youth was either ignored, or suppressed as something diabolical if it opposed the *status quo*. The age-old academic lesson had only one answer, and naturally that was the right one. These lessons were organized and prepared for distant adulthood needs.

Small wonder, then, at the boredom displayed by youth, with its natural consequences, the consecutive order of which were — flogging, the marking system, compulsory school attendance, compulsory subjects and courses, compulsory examinations, after-school attendance, and the like, all of which were false motivation, but supposedly designed to inculcate the principles of democracy.

The next struggle was to select the things which, if learned by youth, would make him educated. These selections were organized into "logical," neat-looking curriculums by the curriculum makers, and youth was required to accept one or the other whether or not it fit his needs. When youth rebelled again, motivation followed by way of punishment, low marks, graduation refusal, work contracts, gold stars, prizes, and other devices, all of which were used to obtain the doing of the prescribed work.

Education for the Present Day

It may be repeated: There is a significant change in emphasis taking place today in our American educational system. We may ask "What is this change in emphasis?" Professor Hughes Mearns of New York University has said, "The new attitude toward child education insists that a larger share of the material of instruction shall be within the child's comprehension and useful for his contemporary living. It demands child's thinking, child criticism, child investigation. It is bound up in the common-sense truth that we grow when we can put heart into an endeavor. We have learned to accept the individual contribution and to use it for superior educational ends. Once reception has been opened for the individual contribution, results come piling in that are nothing short of amazing. Concealed and unsuspected gifts present themselves. We soon become so busy admiring that we have almost no time for correcting. The old school was too preoccupied with condemnation to discover these individual excellences; the new school begins and continues with assured faith in the bountiful gifts of youth."

So it appears that the change in emphasis would lead us to believe that we are making progress. Perhaps the picture is not as dark as we might suspect. We are trying to make youth think — think through his own problems, and the problems of contemporary life. We are trying to teach youth to differentiate between real facts and the flood of propaganda, with which we are confronted at present. We are trying to prepare youth to meet intelligently the problems of realism, unemployment, political aggrandizement, vocational preparation, exploitation, and the economic, social, and moral questions of the day. Time will tell how successful our efforts have been, but if we reach a fair degree of success we need not worry about youth being good and worth-while citizens, prepared to carry on the principles of democracy.

How Vocational Education Can Aid

We are now ready to ask "What implications, if any, has the foregoing to the field of vocational education?" (The term *vocational* is used here in its broadest sense.)

No doubt, it is already generally accepted that an adequate program of vocational education is indispensable in improving and fostering the ideals of the democratic way of living in America. It is true that much progress has been made in offering and fostering the ideals of the democratic way of living in America. It is true that much progress has been made in offering better vocational-education opportunites to our urban boys and girls. There still exists a very marked difference between the vocational advantages of the city child and the child of the rural communities. However, steps have been taken in some areas by providing consolidated schools where very similar advantages are offered. The recent George-Deen federal funds are also providing programs of vocational education in the smaller communities of the several states.

The vocational teacher who is interested in improving his work should study not only his field of work, but the broad program of education in general. He should familiarize himself with the problems not found in his shop or classroom, e.g., he must keep up with the needs, demands, and procedures of industry. He should concern himself with adequate financial support for schools, higher qualifications for teachers, a salary schedule commensurate with professional and trade training and service, an understanding of administration, adequate physical equipment and up-to-date instructional materials.

In addition, he should be prepared and willing to interpret the work of the schools to their constituency — the people for whom he works. In the proportion to which he becomes actively engaged in helping to interpret and solve his problems, will the community in which he works recognize his and his fellow teachers' needs, sympathize, and take the necessary steps to improve the educational program for its children.

How the Vocational Teacher Can Help

The improvement of the learning processes in the shop or classroom is a vital challenge to every teacher, and cannot be evaded long without detection. In order that one may improve his teaching, we might consider the following, all of which are related to the socialization of the learning processes:

1. Language has always been considered a valuable medium of social communication. Opportunities present themselves for the pupil to use language often in a socialized situation. With a little guidance from the teacher, the pupil may relate either in writing or orally some of his experiences which provide effective means for improving the pupil's understanding and use of the language. Let me emphasize that this may be accomplished quite as well in the shop as in the academic classroom.

2. Reading and spelling may be taught as well, if not better in vocational classes than elsewhere. Business has told educators the past few years, that the product turned out by the schools is woefully weak in reading and spelling. Here, then, is an opportunity for the vocational teacher to show his wares in dealing with some of the so-called tool subjects. It has been said that reading is a process of thought communication in which certain skills are essential. The quality of the pupil's growth in reading is improved by the teacher removing it from an academic setup to one of functional social interacting. Experiences that are meaningful offer the most effective way for the

learner to learn to read. Where in our school system exists a more natural environment for the motivation of functional reading and spelling than in the school shops? Here the boy is confronted with experiences that are purposeful. He wants to know more about them—the how, the why, and the which questions are flung at the teacher until sometimes he is at a loss to know how to cope with all of them. The answer is a good shop library with a wide-awake teacher who is willing to plan his work to meet the needs of the whole pupil. Here the situation has been shifted from an academic to a functional process of learning.

3. Since today we are living in a world of science, we must teach our pupils more and more to become science-conscious. Activities should be provided in the shop for the child to explore, extend, and rethink his scientific interests. As these interests grow and develop, it is only natural that the child will expect to find help in the schools in arriving at his solutions. Here again the activities must be organized on a functional basis if the learning process does its best in the mind of the learner. The same may be said of mathematics.

4. The vocational curriculum may be enriched by frequent field trips which take us into a life of realism, into the actual living activities of the community. The vocational curriculum, just as readily as the social-studies curriculum, serves as a means for investigating and appraising the social functions of the community. Manufacturing, industrial, and labor conditions, housing, marketing, recreation, governmental conditions, conservation of natural resources, and the like, are real and vital problems to be studied, analyzed, and understood, because of the implications involved for improved living conditions in a complex social order. Just as these problems are understood will social responsibility be assumed for the solution of them.

5. The school, the shop, and the classroom are miniature social communities in which pupils of various ages work and live together from 6 to 7 hours per day over a period of 12 plastic years of their lives. Through these social relationships, the pupils acquire certain attitudes, concepts, and social understandings, or misunderstandings, which are bound to influence the meaning and quality of their human relations. Are they what we wish them to be? Are we sure that we know what they should be? There must be continual appraisal by the teacher as to the effectiveness of his instruction and guidance, which should be measured by the evidence of growth in the pupils under his charge. The work of developing a personality is a serious obligation. The teacher should be a student of child psychology, always prepared to meet social changes which means flexibility to adjustment, in order that the work of the shop and classroom may be so organized as to provide the maximum integration of the right kind for each individual pupil. This may be considered a challenge to some; it may seem well-nigh impossible to others, but it can and should be attempted by all teachers—both vocational and nonvocational alike. It should not be accepted as idealistic, but as a part of our job. When we have reached this goal, we shall be able to detect in our pupils (*a*) a sense of social-mindedness, (*b*) a sense of being really wanted, (*c*) a sense of belonging to the group, (*d*) a sense of pride in his work accomplishments, and (*e*) a sense of human relations and understandings. He has been taken through the maze of the unknown to the known with all its implications for a successful individual in a socialized order of living.

Summary

By way of summary, the writer has tried to present, in the briefest way possible, a few principles of an old American educational philosophy, which has guided the instruction in our schools down through the years. To be sure, it has been either modified or augmented with change from time to time, but always with the basic idea and thought that it must further the principles of American democracy.

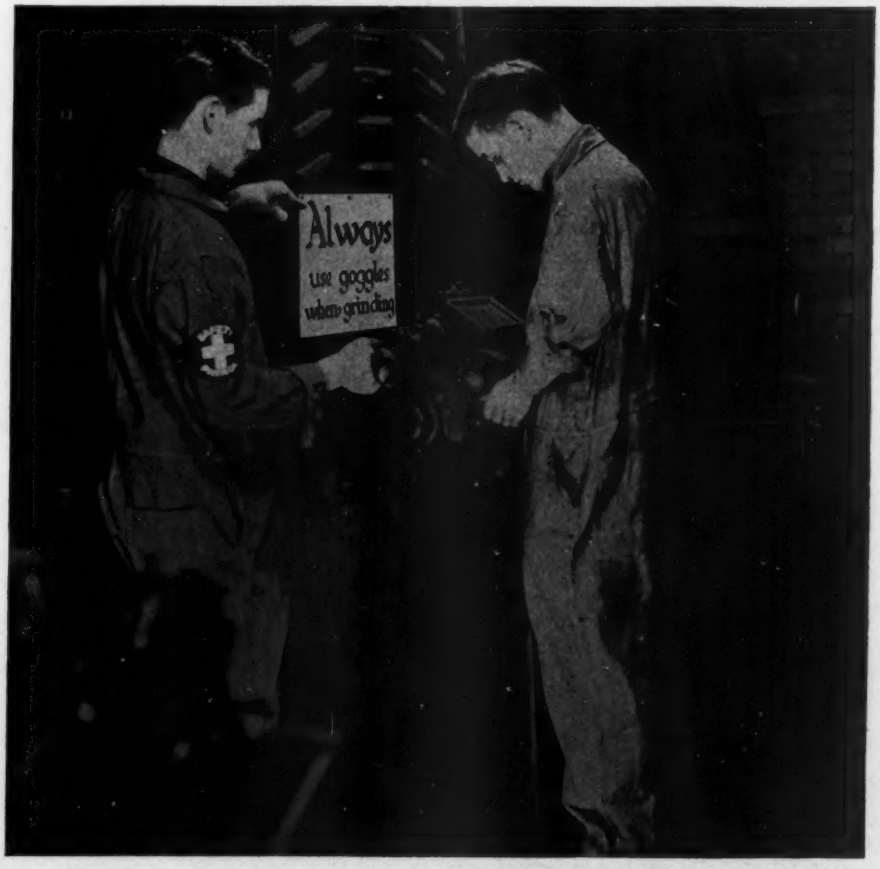
This should not in any way be construed as a criticism of our great American public-school system, for such is not the motive of the writer. Historical aspects have been mentioned only to show growth in our educational thinking. Education for all is still an accepted slogan in this country, even though all may not receive it.

In our educational thinking of today, we have been forced to change the emphasis, but this is as it should be if we are to make progress in a dynamic society. We are all aware of the changing conditions in our world of today. And, with a little reflective thinking, we can determine the implications that arise in the form of problems to be solved caused by these changes.

Youth is confronted with living in a more complex social and economic order. The world today is just a community. Therefore, our obligations as teachers have been increased, the details of which should be familiar to all school people.

The vocational teacher, in the opinion of the writer, certainly has an equal, if not greater, opportunity, in helping to teach and develop in the youth of today social relationships, attitudes, ideas, and understandings that will aid him in his future human reactions. The shop or laboratory presents a natural situation, the activities of which may readily be made purposeful. This, enriched by scientific points of view and frequent field trips into real community activities where the actual problems exist, provides much to be organized and taught on a functional basis, with the resulting social integration of the whole individual.

When we have placed our teaching upon this plane, if we widen our viewpoint, and if we allow our work to function wisely, we will point out to our students the way to successful living in our democracy.



The safety inspector on the job. O. P. Schneider, shop superintendent, West Technical High School, Cleveland, Ohio

How to Start Out a Printshop Class

R. Randolph Karch

Technical Supervisor,
Department of Publishing and Printing,
Rochester Athenaeum
and Mechanics Institute,
Rochester, New York

A timely article which may be read with great profit by every teacher of industrial arts or vocational education.

"I owe all my success in life to having been always a quarter of an hour beforehand." — *Lord Nelson.*

Planning beforehand just how we will start off our classes in the printshop will pay dividends in the saving of time and in the absence of mistakes over the period of time between June and September.

Getting the Shop in Readiness

The first consideration, usually, is getting the shop in order for the new students. If the shop has been been correctly *put to bed* for the summer months, then there will be the job of taking grease from all items of equipment which would have rusted through nonuse during vacation time. Such items are: Composing sticks, steel-top imposing table, cutter, presses, stitchers, and other machinery. Usually there are a few boys in the advanced classes who are willing to come to the shop ahead of time to help with this work. This is quite preferable to waiting until the new classes enter, and having inexperienced boys do the work.

Installation of New Equipment

After the shop as a whole has been put in readiness for work, the new equipment, if any, may be uncrated and erected. Press rollers (usually ordered before the vacation months, so that the old cores can be renewed with composition and seasoned before the new year) may be cleaned of the coating of oil and put back on the presses.

Stock Inventory

When the stock for the new year has been unpacked and placed on the shelves, it is a good time to establish a stock-inventory system, which will act as a series of danger signals when paper runs low. See the printing section of *Bruce's School Shop Annual* for 1931, pp. 213–214, for a perpetual stock-inventory system.

Cleaning Up

There seem to be two methods of *cleaning up* the shop as practiced by printing teachers today. One has the type cases put in good order at the beginning of the year; another does this work at the end of the year. Usually, the latter method is better, because of the interest factor involved — students would rather, on the whole, clean up their own *mess*, rather than straighten up what a preceding class had pied and mixed.

Sometimes, however, a teacher finds himself so ridden with production during the last week of the old year that he cannot hope to finish the task of straightening up, and some cleaning is necessary at the beginning of the next year. In either event, it is necessary periodically to straighten out the type cases, sorts and leader boxes, brass rule, borders, stock shelves, galleys, and sticks.

Assigning Work and Working Areas

If sizes of classes are known before the boys actually enter the shop on their first day, it is easy to develop some sort of an assigning blank so that working areas, cases, galleys, galley racks, and composing sticks can be allotted to the various classes with the least difficulty. With these assignments in written form, the task is facilitated, and there will be little need for arranging schedules at the last minute, with a class ready to go to work.

Course Materials and Texts

Changes in the existing course material, although usually done by the far-seeing printing teacher long before the new school year starts, must certainly be put into effect during the first few days of the new year. Lectures, if any, can be changed at any time, but with the demands for weekly or monthly course plans by administrative officers, it is well to have this material in finished form at the start of the year. New material in the form of technical information or guidance outlines secured during the summer must be added to existing course material. Helps in this work have appeared in past issues of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION as follows: "Occupations in the Letterpress Printing Field" (duties and wages), October, 1937, p. 320; and "Illustrative Material for the Printing Instructor," October, 1930, p. 370.

Now Is the Time:

1. To establish that stock-inventory system.
2. To finish that "clean-up" job (perhaps not completed last spring).
3. To make needed changes in the course material.
4. To devise a system of handling production.
5. To effect changes in class scheduling.
6. To establish a foremen's or printing club.
7. To develop a graphic grading plan.
8. To start plans for the shop and school newspaper or magazine.
9. To rearrange the movable equipment in the shop to effect greater efficiency and saving in time.
10. To prepare short talks on the accident and health hazards encountered in the shop.

Accident and Health Hazards

With beginners in the printing classes, the instructor is confronted yearly with the problem of informing the uninitiated of the accident and health hazards encountered in the shop. Unless some provision is made in the regular course of study for instructions on the use of machines in the light of their dangers, the teacher should devote some class time for a general discussion on the *do's and don'ts* for the operation of proof presses, and other such dangers as leaving cases hanging out at the bottom of cabinets. A re-reading of the printing sections of the October, November, and December issues of this magazine for the year 1935 will enable one to plan a good class discussion on this subject.

Handling Production

Because of peaks in printing orders, and the lax attitude on the part of those who have the authority to demand printing production, some procedure to control this necessary evil must be planned (and perhaps fought for) by the teacher at the beginning of each year. Systems for copy-cutting, starting a difficult job, the incompleted workboard, and other production control aids appeared in the July, 1936, issue of this magazine. These and other schemes discussed have been tried out by several printing teachers, and found to allow the teacher more time from production cares to devote to the primary job: that of teaching.

Many teachers of printing have won their superiors over to the following plan: That all production be of value as course projects, and that this printing be ordered far enough in advance (usually a year) to allow a steady stream of course projects to flow into the shop, thus eliminating peaks of production wherein the class finds the most grief.

Class Scheduling

Although class schedules are usually made out far in advance (and usually without the co-operation of the printing teacher!) there is often some chance to change existing schedules at the beginning of the school year, provided it is taken up with school officials before the new year gets fully under way. Where advanced classes are very large, there may be maintained a staggered schedule in which some of these students may come to the class with beginning groups. In doing this, they may take on such duties as productive printing, as well as act as class foremen over the younger boys. This has been found a far better plan than to appoint foremen from the beginners' groups, because of their lack of knowledge of the subject, and their more immature years. The fact that these advanced students can work along with little instruction will lighten the teacher's burden considerably. And, this is much more preferable than having overcrowded classes of advanced students.

Doubling Class Periods

It has been found that, under certain shop conditions, the amount of work done by a given pupil in a double period will be about three times that of what he can do in a single period. School administrators seldom look for advice when scheduling printing classes. It is, therefore, the job of the printing teacher to see that these superiors are cognizant of the facts about shopwork and schedules, and to do his utmost in bringing about better working conditions for himself. See "Effect of Doubling Class Periods," INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, January, 1937, p. 9.

Graphic Grading Plan

Wall charts showing the advance of each student in each class through the course have been found to be popular with boys, as well as a good grading scheme for the instructor. In these charts the student can *see* his progress as compared with others in his own class, and his class standing compared with other classes. A simple form, which can be cared for by the class student foreman is little burden on the teacher, and a great interest-getter for the students. The beginning of a new year is the time for establishing such a device.

The Art of Molding

L. M. Rigelman

Middleville, Michigan

An excellent article on casting in plaster of paris.

By employing the various methods used in making ornamental statuary, the principles of metal molding can be taught very successfully. Because of the equipment required, few industrial-arts shops can set up a course in foundry practice. Even where this is practical, the student would have to supplement materially the limited experiences he would acquire in school before he could practice vocationally what he had been taught. Even if the smaller school shops could offer such courses in foundry work, unless the student were choosing the subject as a lifework, he never would be able to use his ability in an individual manner, for the equipment required would most likely bar him from applying his knowledge as a hobby or as an activity in the home or the camp shop. With plaster of paris, however, which does not require any elaborate or expensive equipment, the principle of casting can be taught readily. Every medium used in making the various kinds of castings, such as metal, concrete, wax, and the like, requires its own individual treatment, nevertheless, the underlying principles of molding with all of these materials can be taught with plaster of paris.

Plaster-of-paris molding is a most fascinating hobby and requires very little equipment. As a camp project it has yet to find its equal. Boys and girls alike are eager to spend hour after hour in this fascinating craft. Book ends, lamps, garden furniture, desk ornaments, and many other projects have been produced by these eager youngsters not only in plaster of paris, but also in concrete and Keene's cement.

In the making of plaster-of-paris casts, the three types of molds commonly employed are: *Waste molds, piece molds,* and *elastic molds.*

In the making of a *waste mold,* the model, usually of clay, is covered with liquid plaster. When the plaster has set, the clay model is removed and fresh plaster is poured into the mold. When the cast has hardened, the mold is carefully chipped away — thus wasted. This method is not very appropriate for the school shop.

The *piece mold* is made in sections so arranged that the pieces can be easily assembled. Liquid plaster is then poured in and after it has set, the mold is taken apart

Fig. 1. A model showing undercuts

Fig. 2. The figure to be copied

and used over and over again. This method is particularly adaptable for camp, home, and school-shop work.

The *elastic mold* is made of glue or rubber and is flexible so that it can be removed from the cast without damaging the mold. It can be used over and over again, and except for the fact that the glue dries out in time, it has almost unlimited possibilities.

Since the waste mold is not very practical, the instructions in this article are limited to the piece-mold process of making statuary. It should be borne in mind, however, that not all statuary can be made by this process. Articles like those shown in Figure 1, which have undercuts, cannot be reproduced by this method. Statuary that must be made by a flexible mold will be described in a later issue. However, nearly all china and white metal statuettes are suitable for models in this process. It is hoped also that the student who tries to master this craft will eventually design a few of his own models and then proceed to reproduce them. In any event, one may have a full-time hobby repairing and reproducing the broken statuary that he and his friends find about the home.

Equipment Needed

1. Simple statuette.
2. Modeling clay (plasticene), 1 lb.
3. Plaster of paris.

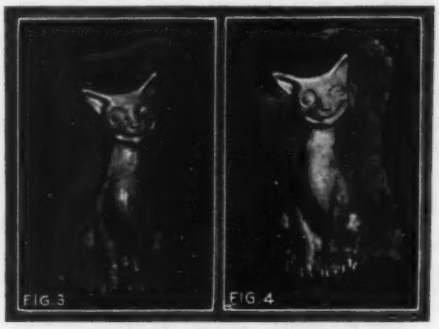
4. Pan and case knife.
5. Sweet oil or stearine solution.

The stearine solution is made by dissolving stearine in kerosene to a creamy consistency. It is used to grease the molds each time a cast is made. If a mold is very porous, a little sweet oil mixed in is good. Sweet oil alone may also be used.

Since this hobby is a little messy, choose a suitable place for the work.

It is well to start with a simple statue similar to the one shown in Figure 2. Be sure to follow each detail and *take your time.*

The first step in reproducing the statue is to find the *high lines* at which the mold must be divided. *These must be carefully chosen.* No section will come apart unless the portion being molded slants toward the mold. In other words, a section should not cover more surface than will draw out of the mold without breaking. With this in mind take a soft-lead pencil and mark along where the divisions must be made. Most



Figs. 3 and 4. Building the fence for the first section of the mold

china and metal objects show these lines.

Having made the parting lines, place a strip of clay one inch wide along where the first section is to come. See Figure 3. Remember this clay is to form a backing for the first section of the plaster mold and must be worked down smooth as shown in Figure 4. The clay strip must be placed right along the lines, or the section cannot be removed.

Fig. 5. Applying the grease. Fig. 6. Applying the plaster for making the first section of the mold

Figs. 7 and 8. Building the fence for the second section of the mold

Avoid making dividing lines across the face of a statue.

When you are satisfied that the foregoing instructions have been carried out, make a clay base which also will form a backing for what will be the bottom of the mold. See Figures 4 and 5.

Next, grease the statue and clay walls *thinly* with either sweet oil or the stearine solution, using a small camel's-hair brush as shown in Figure 5.

Next mix the plaster of paris for the first section of the piece mold. To do this, estimate the amount of water needed and place in a container. A coffee can will serve very well for small work. Then sift plaster of paris into the water *without stirring* until an island forms on top of the water and stays there. Let soak a short time and then stir. When about the consistency of whipped cream, begin patting on the face of the statue as shown in Figure 6. Build the plaster out smoothly to the very edge of the clay wall. Make the plaster about one inch thick over all.

When the plaster is sufficiently set (so that it appears warm to the touch or can just be scratched with the fingernail), the clay walls used for backing should be peeled away. See Figure 7. Smooth the edges and the surface where the clay might have been rough, and with a common table knife scoop shallow holes in the plaster where the next piece is to be joined. These act as dowels in lining up the pieces of the mold. See Figure 7.

Figure 8 shows the clay base shifted to the back side of the statue. It should extend one inch beyond the back of the figure to be cast. Then proceed to lay off the next section, making a clay fence or wall up the back as shown in Figure 8. After the clay fence has been completed, apply a thin coat of grease (sweet oil or stearine solution) to the clay wall, the figure, and the division wall of the plaster-of-paris mold already built. See Figure 9. Continue in this way with each succeeding section, until sufficient pieces have been made to form the mold. In this particular case, three sections are adequate. As each section is finished, it must be carefully greased with one of the greasing solutions as shown in Figure 9. Be careful not to make the coat of grease too heavy.

The stearine solution will usually give the best results, especially in making casts from newly made molds.

Figure 10 shows how the plaster wall of the mold is being built up for the No. 2 section. Keep in mind that the plaster should be about one inch thick. Be sure that the plaster does not overlap the first section, but meets *flush.*

When the plaster is hard, take away the remaining fence as shown in Figure 11. Trim to smoothness and scoop shallow holes in for the dowels, as in Figure 7. Leave the clay base in place to form a backing for the last section. As each section is finished, it may be well to pull the sections apart to see that they can be removed readily. Of course, the pieces must be re-

Fig. 9. Greasing up for casting the 2nd section. Fig. 10. Applying the plaster

placed carefully to help in making the next section of the mold.

It must be borne in mind that the plaster for each section must be separately mixed. Do not attempt to mix enough plaster at one time for all sections.

After the last section has hardened sufficiently, the mold must be taken apart. See Figure 13.

This is done by gently inserting a knife blade in one of the dividing lines and then prying the sections apart. As soon as the

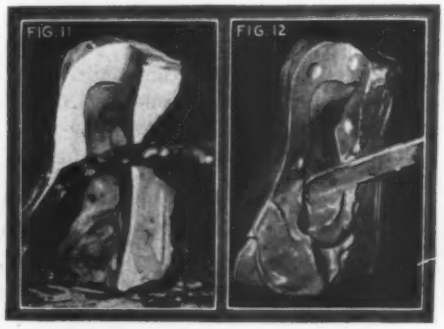


Fig. 11. Removing the fence. Fig. 12. Applying the plaster for the last section

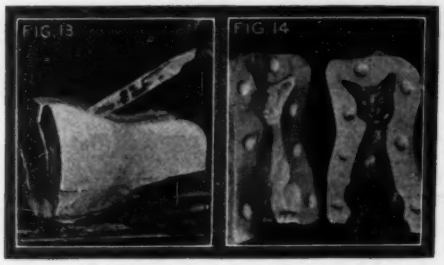


Fig. 13. Opening the mold. Fig. 14. Removing the model

piece has loosened, lay aside the knife and lift the section off with the fingers. *Do not use too much force.* If all of the directions have been followed carefully, the mold will come apart without much trouble.

When one piece has been removed, gently tap the wall of another section and as soon as it is loosened (you can tell by the sound after a little experience), lift it off. *Do not spoil* the work at this point by being rough and impatient. Figure 14 shows the completed mold.

Before attempting to make a statue, it is necessary to lay the new mold aside in order to permit it to dry. A clean dry room, or over a warm-air register (if not too hot), will dry the mold in a few hours. It may also be dried out of doors where the air can get at all parts of the mold.

If the mold is to be used for making many statues, the dry mold should be soaked in hot linseed oil, or the oil may be brushed on freely until the plaster will absorb no more oil. Then let the mold dry thoroughly again.

The dry mold may also be given a coat of white shellac. This must then be allowed to harden, after which the mold is ready for use. For greasing molds finished by one of the foregoing methods, either of the greasing mediums mentioned may be used.

If speedy results are aimed at or if but a few casts are to be made, you can thoroughly grease the inside of the green mold with the stearine solution, and cast immediately. Molds treated in this way have yielded dozens of statues. However, if one is not careful with the greasing, the minor details will fill up, and the statue will not be clear cut in design. If, however, the greasing is done with care, and if the several coats are spread evenly each time, this method will work about as well as the shellac method.

After the mold has been properly prepared, put the sections together (without the original statue in it) and tie with a string, or secure with rubber bands. See Figure 15. In a mold of many pieces, such as a collossal figure, the pieces are assembled and then plaster is applied on the outside so that the pieces will not fall apart. When the cast is set, the outer layer is chipped off and the pieces removed unharmed. For small work, however, a string or rubber band will be sufficient to hold the pieces of the mold together.

The mold is then ready for the first cast. Mix the plaster in the very same manner as before instructed, but pour into the mold when about the consistency of thick cream. *Do not pour too thin,* as this produces air bubbles. Having put a little plaster into the mold pour it back into the container with a rolling motion so that the plaster will reach each portion of the mold while doing so. Repeat this process so long as the plaster can be poured. When thick, however, fill the cast and set aside to harden.

The rolling motion previously described

Fig. 17. A. Novelty lamp made of plaster of paris with a flexible mold. B. The base of a very attractive table lamp made from a two-piece plaster mold. The hole for the wire and the threads for the fixtures are inserted in the process of casting

keeps air bubbles from forming on the side of the statue. Pouring the plaster back into the container is for the same purpose.

Removal of Statue

The statue can be removed best when the chemical action of the setting plaster has made the cast warm to the touch. After this has happened, proceed to pry the pieces loose as was done in making the mold. Be very gentle as the new statue is apt to be softer than the mold. Remember, after the first piece of the mold has been removed, to tap the wall of another piece gently until loose, then remove it with the fingers.

When the new statue has been removed, little *pin* lines will be visible where the sections were joined together. See Figure 16. These may be removed with a knife while they are still wet. They will hardly be noticed when the statue has dried.

Then set aside the new statues to dry before painting or finishing.

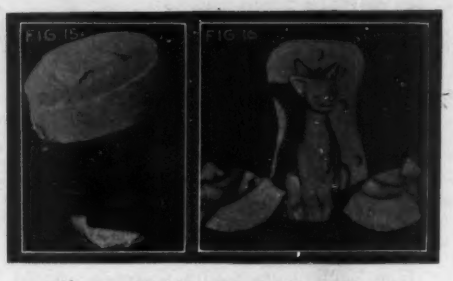


Fig. 15. Making the casting. Fig. 16. Removing the casting

Remember — the molds should be greased each time a new cast is made.

Timely Tips

Plaster cannot be mixed over again once it has set.

Plaster of paris expands when setting. *Do not* fill a vase or hollow statue — *it will break.*

Dirty casts can be cleaned with very thick washing starch. Apply the starch thickly and freely. When it dries, it will peel off, bringing the dirt with it.

How to Finish Casts

Plaster of paris, or composition statuary that has been thoroughly dried, can be finished with enamel, lacquer, or even common household paint may be employed. The kind of finish depends on the individual's taste or on the purpose for which the statue is designed.

It is best in most cases to give the cast a coat of shellac before applying any of the finishes just mentioned. The shellac tends to fill the pores and makes a better basis for the finish.

For an antique bronze finish, give the statue a coat of shellac. When this has dried, apply two coats of high-grade gold bronze. After a few hours, apply another thin coat of white shellac. When this has dried thoroughly, antique with the following mixture. Mix yellow-ocher tube color with turpentine to a thin wash and apply over the entire statue. While still wet, wipe off as much of the mixture as will come off readily. Use a clean dry cloth. Other colors such as light blue, green, and the like, also may be used as wash paints.

For a wax finish, take a good white beeswax and dissolve it in turpentine to the thickness of milk. Then brush this solution freely on the unfinished statue until it will absorb no more. Let the wax set a short time, and then take a lintless cloth and polish briskly.

This finish also may be antiqued by applying a second application of the wax solution to which a little color, such as yellow ocher has been mixed. After applying one coat of this mixture, the statue must again be polished.

Metal Craft for the Industrial-Arts Laboratory

Glenn E. Best

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The working of metals has been carried on by mankind for centuries. Metal craft in the industrial-arts laboratory is a medium which fascinates the modern boy or girl. It has also been found quite satisfactory for adult evening classes, summer-camp courses, and as a hobby to be carried on in the home workshop.

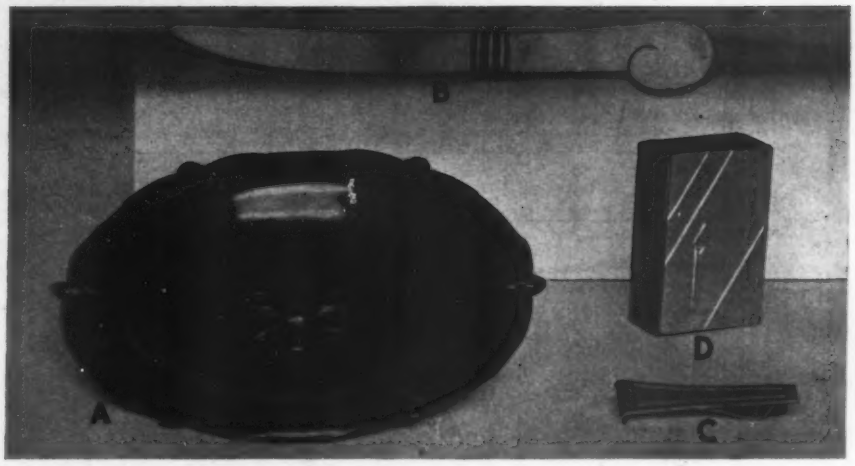
In a modern industrial-arts laboratory, the working of metals holds an important place, justified by the fact that in a highly technological age such as ours, metals occupy a significant place. It seems essential, therefore, that one know something about them and the part they play in affecting our daily living.

Metal craft for industrial arts furnishes many interesting and valuable projects which may hold the attention of the pupil and at the same time furnish him with worth-while information. It also tends to develop the pupil's abilities, appreciations, and skills.

Through metalwork of this nature, the pupil learns how to read and interpret drawings and blueprints. He also gains some understanding of the elements of design. He learns of the properties, characteristics, and uses of different metals such as silver, copper, iron, aluminum, brass, and pewter. He learns certain operations in working these metals. Among these are filing, riveting, bending, sawing, piercing, chasing, soldering, hammering, drilling, tapping, and others.

Metal craft is popular in the industrial-arts laboratory because in addition to learning many useful and essential operations, the student can make projects that may be finished in a short time, are artistic, and of value to him. Many projects can be made of inexpensive materials. Few tools are required for this work. Many of them can be made by the student, such as wood or metal forms, chasers, chisels, stakes, and hammers.

It has been rightly said that there is no inspiration without expression. This work permits of creative thinking, artistic expression, and problem solving. It also develops initiative and self-reliance, and at the same time tends to care for individual differences.



A. 6-in. copper tray. B. Letter opener. C. Tie clip. D. Match-box cover

Inexpensive Materials. The projects described in this article were planned with the cost of material in mind. The designs are such that the projects, besides being artistic and useful, are economical to make. Other materials than those suggested may be substituted in each of the projects. It has been the author's purpose to offer experiences in working with many different metals. It should also be noted that the designs and surface decorations are only suggestive, and may be altered to meet the tastes of the craftsman.

Few Tools. Metal craft is particularly adapted to the shop where equipment is limited, because few tools are required for obtaining satisfactory results. The author has had many of his students make tools and devices to assist them in their work. Very usable hammers may be made from old automobile axles. Chasing tools, chisels, punches, and raising tools may be made from worn-out round and square files. Wood forms for use in raising metal may be made from hard wood and are very

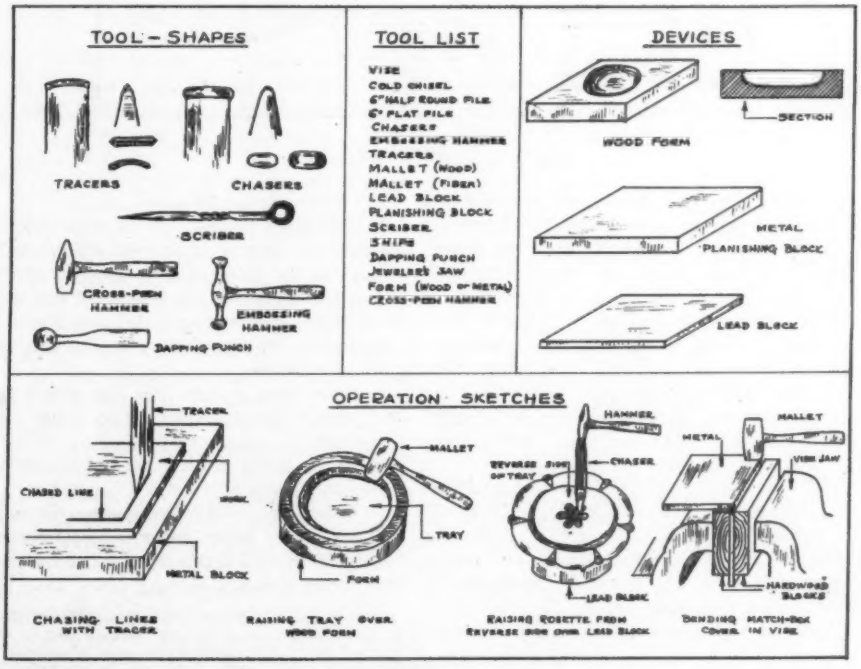


Fig. 1

serviceable. Metal forms of aluminum alloy may be cast from discarded automobile cylinder heads. Because of their durability, they are superior to wood forms.

Instructions for Making 6-in. Copper Tray

Material: 1 piece annealed copper, 6-in. diameter, 18 gauge.

1. Transfer design to metal. The design may be transferred to thin tracing paper and fastened to the metal with rubber cement, or it may be transferred directly to the metal by means of carbon paper and a hard lead pencil.
2. With snips or jeweler's saw, cut away surplus material and file to contour.
3. Trace in design lines on center and border. Be sure to rest part of tracer into previous marking so as to insure clean-cut lines. Retrace lines a second time lightly. See operation sketches, Figure 1.
4. Raise tray to shape over wooden form using buckskin, fiber, or wood mallet. See sectional view in Figure 2.
5. Raise the rosette in center of tray from the reverse side over a block of lead by using a chasing tool and hammer. See operation sketches, Figure 1. Raise designs on border in same manner. The center of the rosette is raised with a dapping punch.
6. Place a chasing tool in vise, and with embossing hammer emboss raised portion.
7. Turn outside edge of tray over a cross-peen hammer placed in vise, striking blows with a buckskin or fiber mallet to shape shown in sectional view of tray in Figure 2.
8. Clean carefully with 2/0 steel wool and color in solution of liver of sulphur.[1]
9. High-light with steel wool, and finish with a coat of clear lacquer or two coats of beeswax. Polish.

Letter Opener

Material: 18-gauge half-hard brass or 20-gauge sheet iron.

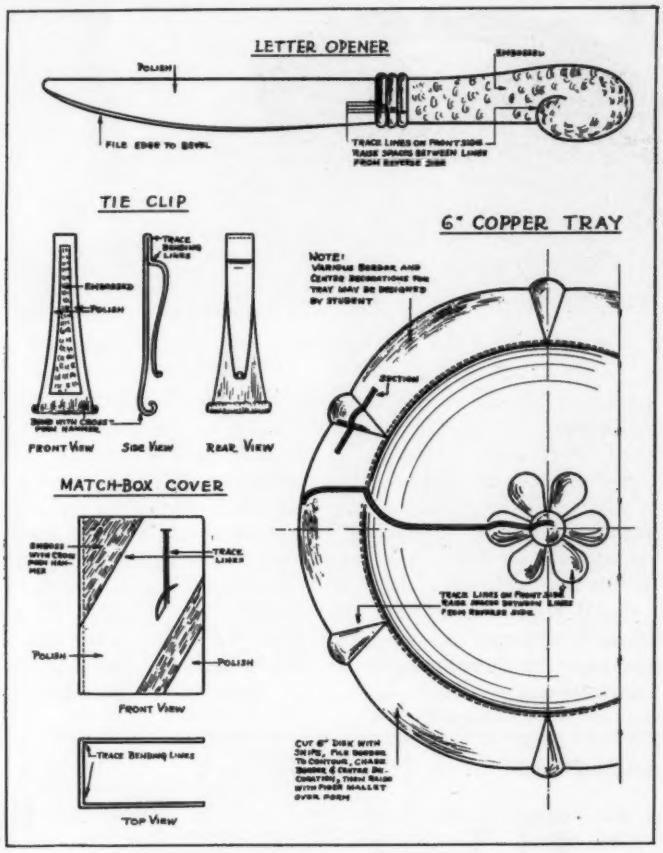


Fig. 2

1. Transfer design to metal.
2. With jeweler's saw, cut to shape, file to contour, and smooth edges with emery cloth.
3. Trace the three straight lines on handle with a straight tracer, and the curved line with a curved one. See operation sketches, Figure 1.
4. Emboss handle with embossing hammer on front side only.
5. Raise from reverse side the spaces between the three chased lines. Use chaser over a lead block.
6. File a bevel on the blade of opener as shown in Figure 2.
7. Polish blade and entire reverse side with 6/0 wet or dry garnet paper. Finish by using buffing wheel with 0 tripoli, or polish by hand with silver polish.

[1] *Liver of sulphur solution.* Dissolve several small pieces of liver of sulphur in warm water. Immerse tray in solution and move about until desired color is obtained (a dark slate, almost black). Rinse well in hot water. Let dry, or dry with soft rag.

8. Lacquer with clear lacquer, or give two coats of beeswax, then polish.

Tie Clip

Material: 20-gauge sterling silver ¾ by 4 in.

1. Transfer design to metal.
2. Trace lines of design before cutting to shape.
3. Emboss part shown in Figure 2.
4. Cut to approximate shape with snips or jeweler's saw, and file to contour.
5. With cross-peen hammer, bend a scroll on larger end of clip. Now turn the work over and bend a small scroll on opposite end. (See Figure 2 for size and shape.)
6. Trace in lines for bending.
7. Bend at first traced line over hardwood block until the two surfaces are close together. See Figure 2. Bend at second traced line to an angle of 90 deg.
8. Begin the curve of clip over a lead block and finish bending over a smooth round iron rod of suitable size. See Figure 2 for shape.
9. Polish surface lightly with 8/0 speed-wet paper. Do not rub the embossed surface with the garnet paper. Finish by polishing with a good silver polish.

Matchbox Cover

Material: 20-gauge sheet aluminium 2⅛ by 3¾ in. Brass or copper may be substituted.

1. Cut metal to desired dimensions.
2. Transfer design to metal.
3. Mark the lines to be traced on the metal with a scriber.
4. Trace in lines shown in Figure 2. Be sure to rest part of tracer into previous marking so as to insure a clean-cut line.
5. Trace in initial using both the straight and curved tracer.
6. Trace in bending lines on reverse side. See Figure 2.
7. With cross-peen hammer, emboss surfaces as shown in Figure 2.
8. File corners of cover slightly round. See Figure 2.
9. Place work in vise and bend to desired shape. See operation sketches, Figure 1 for illustration showing how to use wood blocks for bending.
10. With 2/0 steel wool, polish lightly. Finish by buffing with 0 tripoli and waxing. If made from other materials, suitable finishes for those materials should be used.

A RECIPE FOR EDUCATION

To infinite patience add a little wisdom, carefully strained through profitable experience. Pour in a brimming measure of the milk of human kindness, and season well with the salt of common sense. Boil gently over a friendly fire made of fine enthusiasms, stirring constantly with just discipline. When it has boiled long enough to be thoroughly blended, transfuse it by wise teaching to the eager mind of a restless boy and set away to cool. Tomorrow he will greet you an educated man.—*Grover.*

Testing and Tests

PRETEST FOR INDUSTRIAL-ARTS WOODWORKING CLASSES

James F. Ahlbach, State School for Boys, Jamesburg, New Jersey

This pretest is used for classification purposes, and is given to every prospective student entering the industrial-arts classes for the first time. This information, along with a study of each pupil's *case history*, gives the teacher valuable and essential knowledge regarding the students in his various classes.

It is essential that this test be given at the beginning of the course because it enables the teacher to ascertain definitely, how much each student really knows about the subject which he is about to begin. The teacher can then make plans and organize his instruction, materials, assignments, etc., on the three learning-ability levels: minimum, average, and maximum.

Many new students will make a low score on the test to start with, but, they will improve as they continue with their schoolwork. Later, however, after giving other tests, this *Pretest* should be repeated to ascertain what achievement had been made by the various groups.

The test consists of eight parts, and is divided into 92 questions. Each correct answer, receives one point of credit. Eight points of credit are given for a correct response to Part VIII, "Reading a Working Drawing." One hundred points is the highest possible score any one student can obtain.

Following are the constituent parts of the test:

Part I. True and False Test.
Part II. Completion Test.
Part III. Multiple-Choice Test.
Part IV. Common Wood Joints Test.
Part V. Parts of a Plane Test.
Part VI. Reading Test for Rule.
Part VII. Finishing Test.
Part VIII. Reading a Working Drawing.
Scoring Keys.

Part I. True and False Test

Directions: The following test contains a number of statements, some of which are true and some of which are false. In each case, put a capital *T* in front of the statement if you think the statement is true, or put a capital *F* in front of the statement if you think the statement is false. Do not guess; each incorrectly marked statement counts as a penalty against you.

.... 1. The size of the teeth in a saw determines the difference between a crosscut and a ripsaw.
.... 2. When the beauty of the grain of the wood is to be brought out, paint is used.
.... 3. When a hole is being bored through a board, bore part way through and then bore from the reverse side.
.... 4. A countersink is used for roundheaded screws.
.... 5. A jackplane is shorter than a foreplane.
.... 6. Maple is an example of close-grained wood.
.... 7. Kiln-dried lumber ordinarily costs more than air-dried lumber.
.... 8. No. 2/0 sandpaper is coarser than No. 1 sandpaper.
.... 9. Plain-sawed lumber is ordinarily more expensive than quarter-sawed lumber.
.... 10. When a flat surface is being sanded, the sandpaper should be used on a block.
.... 11. It is best practice to remove blocks of wood and other waste material from the floor around the machines before attempting to operate them.
.... 12. Varnish sets more rapidly than shellac.
.... 13. The blade in the coping saw should have the teeth point away from the handle when the work is clamped in the bench vise.
.... 14. Whenever possible, wood should be sandpapered with the grain.
.... 15. The rule should be set on its edge when it is used for measuring.
.... 16. A roundheaded screw should be set flush with the surface.
.... 17. Black walnut is a soft wood.
.... 18. The coping saw is used to cut out curved lines in thick stock.
.... 19. A No. 12 wood screw is larger in diameter than a No. 6 wood screw.
.... 20. The tang chisel is better for paring than the socket chisel.
.... 21. Best results are not obtained if heavy cuts are taken with a chisel.
.... 22. When finishing close-grained woods, always use a paste filler.
.... 23. It is best to use only the center of the oilstone when whetting a plane iron.
.... 24. A brad is a small, common nail.
.... 25. The dado joint is best for fastening the sides of a drawer to the front.
.... 26. Oily rags should always be put in a metal container.
.... 27. A center line should always be placed on the stock before transferring the design from the pattern.
.... 28. It is possible to use a spokeshave for smoothing curved edges of stock.

Right	Right .....
Wrong	Minus Wrong ...
Omitted	Score .....
Total	

Scoring Key

1. F	5. T	9. F.	13. T	17. F	21. T	25. F
2. F	6. T	10. T	14. T	18. F	22. F	26. T
3. T	7. T	11. T	15. T	19. T	23. F	27. T
4. F	8. F	12. F	16. F	20. T	24. F	28. T

Part II. Completion Test

Directions: Fill in the blanks with the necessary words to complete each of the following sentences. Time, 5 minutes.

1. The first side of a board planed is called the .....
2. Put ..... on screws to make them go into the wood more easily.
3. A tool used to turn screws into the wood is called a .....
4. The size of an auger bit in ..... of an inch is indicated by the number stamped on the tang or round of the bit.
5. A ..... saw is used to cut wood across the grain.
6. For accurate work, a rule should be held on its .....
7. A tool having a crank and used to hold auger bits when boring holes is called a .....
8. Brushes which have been used in ..... should be cleaned with alcohol.
9. Oily rags should be kept in a ..... container.
10. Number 10 stamped on the heel of the saw indicates the number of ..... per inch.

Right	Right .....
Wrong	Minus Wrong ...
Omitted	Score .....
Total	

Scoring Key

1. face	6. edge
2. soap	7. brace
3. screw driver	8. shellac
4. 16ths	9. metal
5. crosscut	10. teeth

Part III. Multiple-Choice Test

Directions: In the parentheses, place the number of the word or phrase that gives the correct answer.

( ) 1. A piece of stock ¾ by 8 by 54 in. contains: (1) 3 board feet. (2) 35 board feet. (3) 2¼ board feet.
( ) 2. How much would a piece of plywood ¼ by 18 by 30 in. cost at 12 cents per foot? (1) 11¼ cents? (2) 22½ cents? (3) 45 cents?
( ) 3. How is walnut wood classified in regard to weight? (1) Light. (2) Heavy. (3) Medium.
( ) 4. Which of the following saws has the finest teeth? (1) Crosscut. (2) Rip. (3) Back. (4) Turning.
( ) 5. Which plane should be used for straightening the edges of long boards? (1) Smoothing. (2) Jack. (3) Block. (4) Jointer.
( ) 6. Which of the following planes does not have a cap iron? (1) Jack. (2) Block. (3) Fore. (4) Smooth.
( ) 7. The bevel of the plane iron when properly ground should be (1) per-

fectly flat, (2) slightly concave "hollow ground," (3) slightly convex.

( ) 8. *Stop boring* several holes to the same depth may be accomplished by using a (1) depth gauge, (2) bit gauge, (3) dowel jig.

( ) 9. Which of the following glues is waterproof? (1) Casein. (2) Fish. (3) Animal.

( ) 10. Which of these glues should be applied while hot? (1) Casein. (2) Animal. (3) Fish.

( ) 11. What is best to use for thinning varnish? (1) Turpentine. (2) Alcohol. (3) Linseed Oil.

( ) 12. Which of the following woods is an open-grained wood requiring paste filler? (1) Maple. (2) Walnut. (3) Red Gum. (4) Cedar.

( ) 13. Which of the following stains will penetrate the wood deepest? (1) Water. (2) Oil. (3) Spirit.

( ) 14. Which of these three stains will penetrate the wood most rapidly? (1) Oil. (2) Spirit. (3) Water.

( ) 15. Of the following screws, which is the most easily twisted off while being driven? (1) Roundhead blues. (2) Brass. (3) Flathead brights.

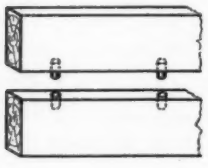
Right	Right .....
Wrong	Minus Wrong ...
Omitted	Score .....

Scoring Key

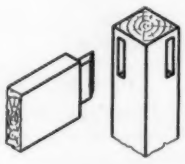
1. (1)	4. (3)	7. (2)	10. (2)	13. (1)
2. (3)	5. (4)	8. (2)	11. (1)	14. (2)
3. (3)	6. (2)	9. (1)	12. (2)	15. (2)

Part IV. Common Wood Joints Test

Directions: On the line beneath each of the wood joints shown, write in the name of the joint.



1_____



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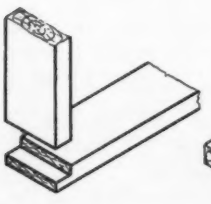

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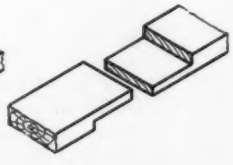

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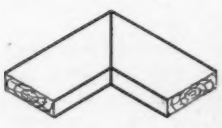

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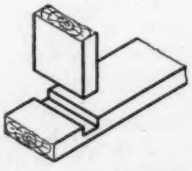

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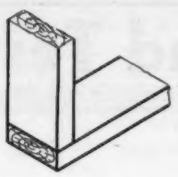
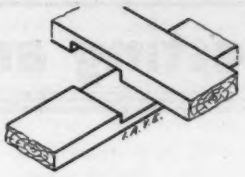


7_____



8_____

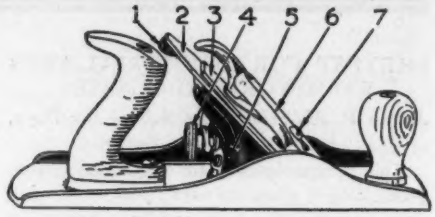
Right	Right .....
Wrong	Minus Wrong ...
Omitted	Score .....
Total	

Scoring Key

1. Doweled edge-to-edge joint.
2. Blind mortise-and-tenon joint.
3. Rabbet joint.
4. Half-lap joint.
5. Miter joint.
6. Dado joint.
7. Butt joint.
8. Cross-lap joint.

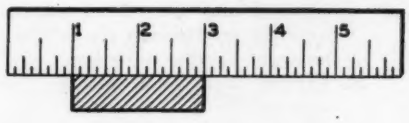
Part V. Parts of a Plane Test

Directions: Fill in the blanks with the number that corresponds to that particular part in the drawing of the plane.

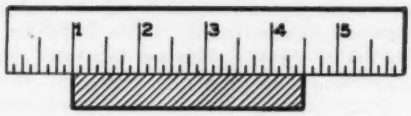


Name of Part	*Number of Part*
Adjusting nut	.....
Lateral adjusting lever	.....
Lever cap screw	.....
Single plane iron	.....
Lever cap	.....
Plane-iron cap	.....
Frog	.....

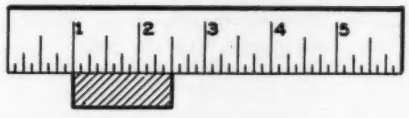
(Continued on page 295)



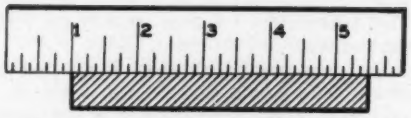
A_____ IN.



G_____ IN.



B_____ IN.



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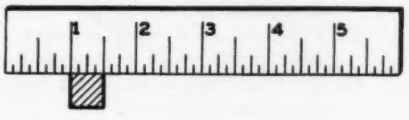

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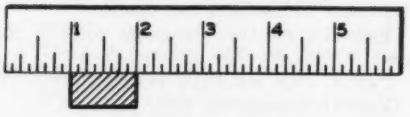

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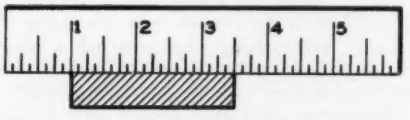

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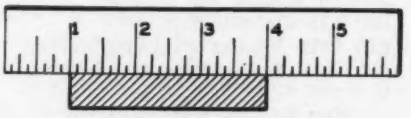

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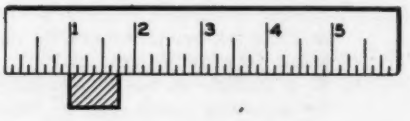

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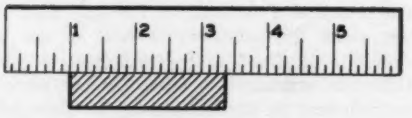

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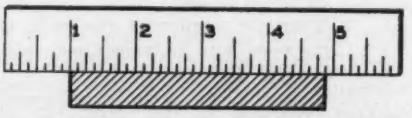

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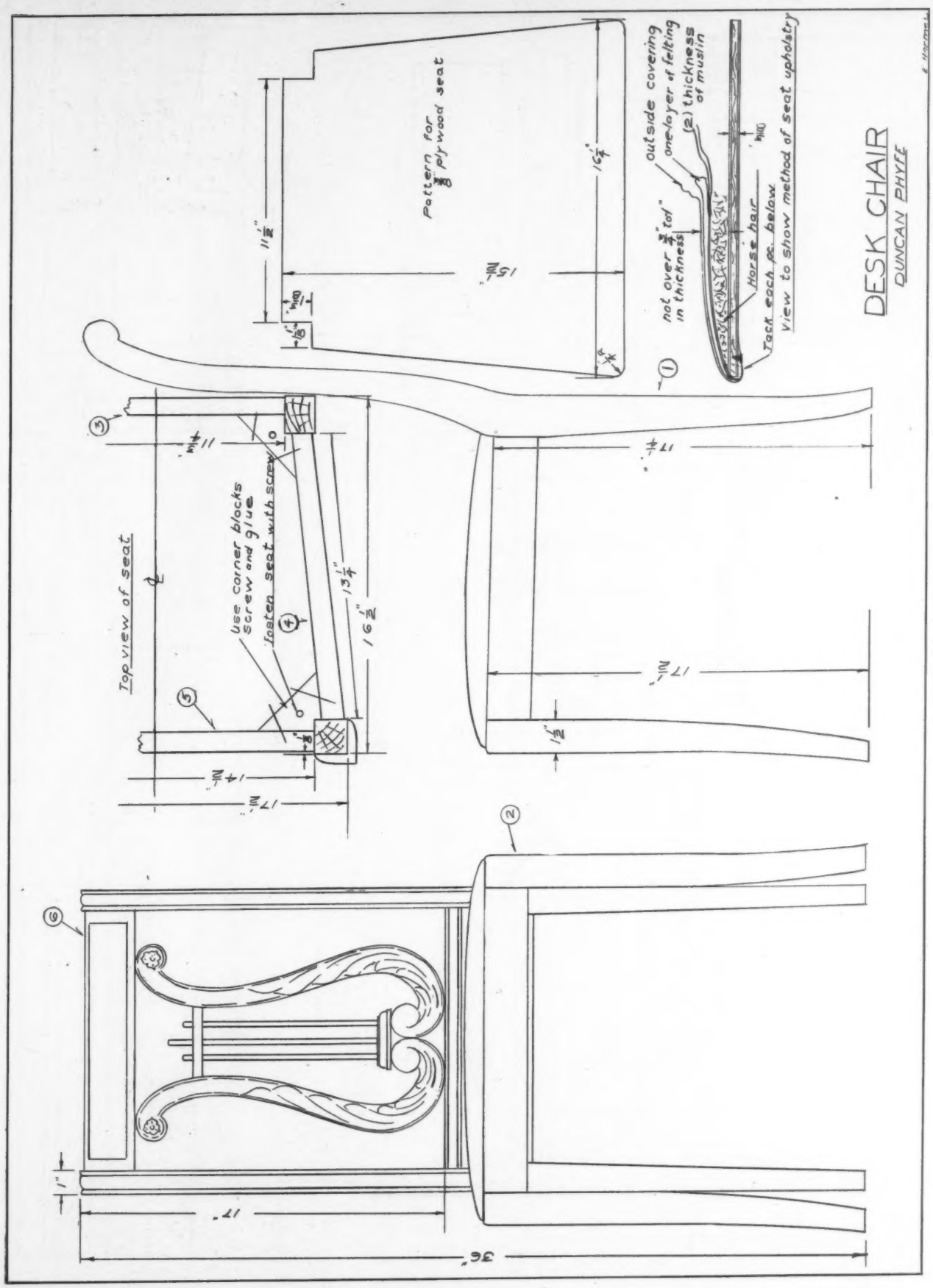
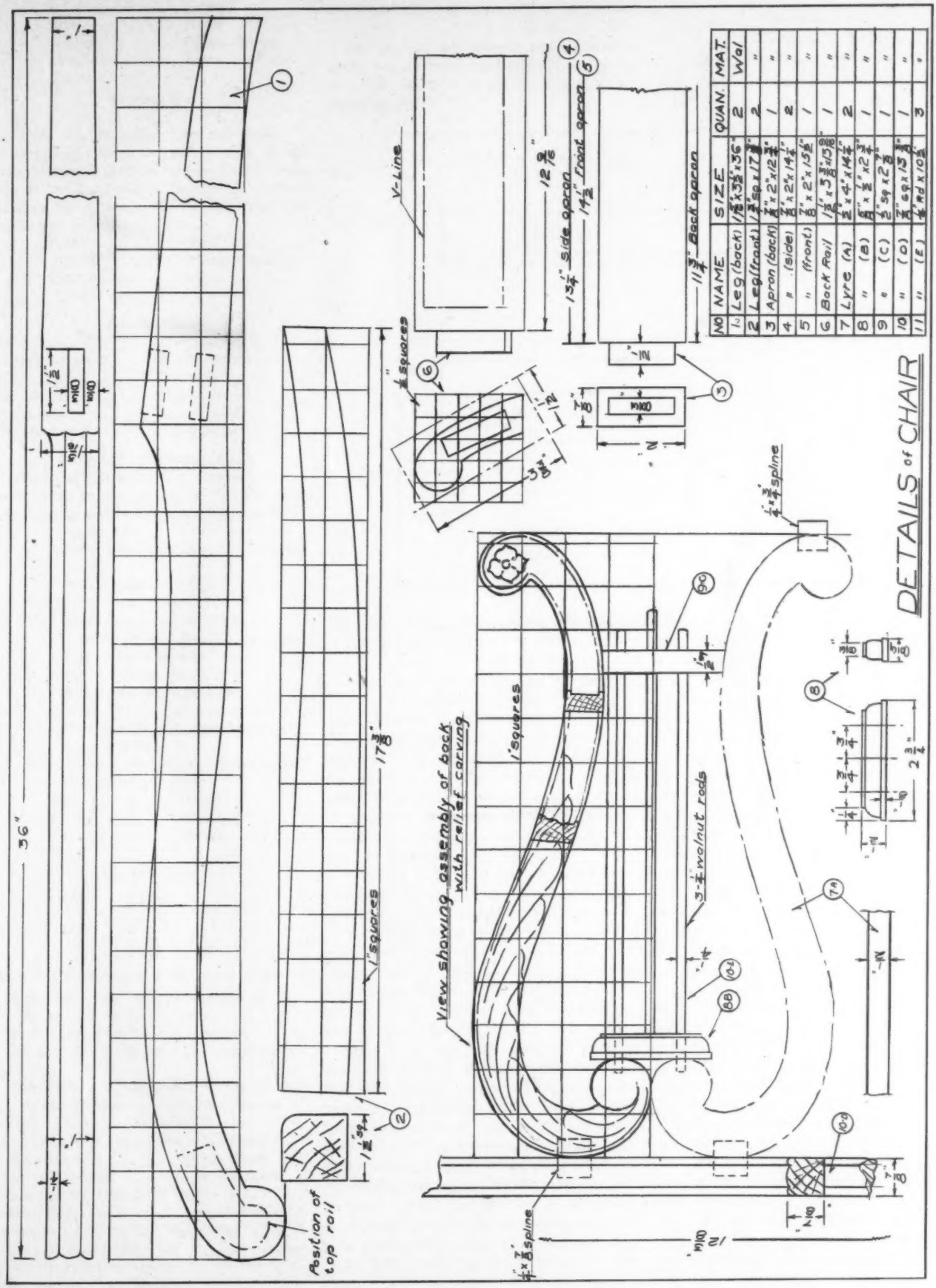


Designed by Earl Harmes, Shorewood High School, Shorewood, Wisconsin *(See page 296 for description)*



NO	NAME	SIZE	QUAN.	MAT.
1	Leg (back)	1⅛"x3½"x36"	2	Wal
2	Leg (front)	1¾"x9"x17 7/16"	2	"
3	Apron (back)	1¾"x2"x12¾"	1	"
4	" (side)	1¾"x2"x14½"	2	"
5	" (front)	1¾"x2"x15½"	1	"
6	Back Rail	1⅛"x3 3/16"x10⅛"	1	"
7	Lyre (A)	2"x4"x14¾"	2	"
8	" (B)	6"x1"x2¾"	1	"
9	" (C)	5"x1"x2¾"	1	"
10	" (D)	7"x6"x15¾"	1	"
11	" (E)	¾"x4"x10⅛"	3	"

Designed by Earl Harmes, Shorewood High School, Shorewood, Wisconsin *(See page 296 for description)*

(Continued from page 290)

Right ..... Right .....
Wrong ..... Minus Wrong ...
Omitted ..... Score .....
Total

Scoring Key

4, 1, 7, 2, 6, 3, 5.

Part VI. Reading Test for Rule

Directions: Read the size of each of the cross-sectioned portions and write the reading on the line beneath. Reduce all fractions to their lowest terms. The rule is divided into eighths of an inch.

Right ..... Right .....
Wrong ..... Minus Wrong ...
Omitted ..... Score .....
Total

Scoring Key

A. 2 inches	G. 3½ inches
B. 1½ inches	H. 4½ inches
C. ¼ inch	I. 1 inch
D. 2½ inches	J. 3 inches
E. ¾ inch	K. 2⅜ inches
F. 1⅜ inches	L. 3⅞ inches

Part VII. Finishing Test

Directions: Number the following operations used in the process of finishing shop projects, in their usual order of procedure.

1. ( ) Apply wax.
2. ( ) Rub down with No. 3/0 finishing paper.
3. ( ) Polish with soft cloth.
4. ( ) Apply coat of varnish.
5. ( ) Apply coat of spirit stain.
6. ( ) Sand lightly with No. 2/0 sandpaper.
7. ( ) Rub down with steel wool.
8. ( ) Apply coat of shellac.
9. ( ) Apply coat of paste filler.
10. ( ) Work filler in pores of wood.
11. ( ) Rub smooth with pumice or rottenstone and oil.
12. ( ) Remove the surplus material, rubbing across the grain.

Right ..... Right .....
Wrong ..... Minus Wrong ...
Omitted ..... Score .....
Total

Scoring Key

1. (11)	5. (1)	9. (3)
2. (9)	6. (2)	10. (4)
3. (12)	7. (7)	11. (10)
4. (8)	8. (6)	12. (5)

Part VIII. Reading a Working Drawing

Directions: You are to do three things with the drawing of the block shown.

First: Complete the right side view.

Second: Fill in the names of the views not labeled.

Third: In the incomplete statement following the drawing, you will find a number of blanks. Refer to the drawing, and fill in the blanks with the necessary information.

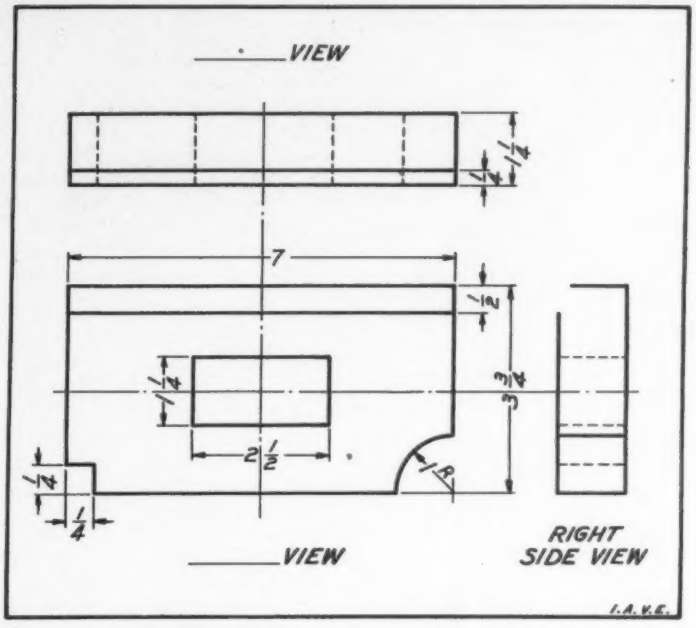
This block is ..... inches long, ... inches high, ... inches thick; it has a mortise through it which is ..... inches long, and ..... inches wide. A rabbet is cut along the upper edge which is ..... inches deep and ..... inches wide; the radius of the arc cut on the right-hand side is ..... inches; the square cut out of the left-hand corner is ..... inches.

Score .....

The student will receive eight points of credit, for the correct response. If partly correct, the teacher is to use his own judgment regarding credit.

Scoring Key

	3¾ in.	½ in.
Top View	1¼ in.	¼ in.
Side View	2½ in.	1 in.
7 in.	1¼ in.	½ in.



SELECTING, PLANNING, AND CONSTRUCTING A PROJECT

Geo. A. Willoughby,
Michigan State Normal College,
Ypsilanti, Michigan

1. Consider the things which are to be done during the course, the time available, and the tools and materials available for the work. Study the handbook to learn about these things and also study the lists of projects suggested. Observe projects which have been completed or look for suggestions in books and magazines.

2. Select a type of project which you think you will be able to do well and which will give you an opportunity to do some of the things listed for the course. Try to make your selection so that it can be done without loss of time and without excessive expenditure for materials. Try to have the project meet a definite need and serve in one of the following ways: Help to develop a home workshop; help to provide some convenience in your home; be valuable in the yard, garden, or on the farm; make a contribution to the school; meet some personal need; help in recording, organizing, or filing instruction material; help in developing a worth-while hobby; help in developing something which may provide income; make a contribution to your club or organization; make a contribution to your community; serve as a teaching aid.

3. Make preliminary sketches of the thing which you have in mind and submit the idea to your instructor for approval.

4. When the type of projects has been approved, get as many ideas as you can from the instructor, from books and from all other available sources and design your project to meet your particular needs on the basis of the information obtained.

5. Make out a complete plan sheet for the project as directed, giving all of the information called for and a complete working sketch showing all details of construction. The plan sheet is very important and is taken into consideration in rating your ability.

6. Submit your completed plan to your instructor *in advance* of the time when you expect to start actual construction work.

7. After the plan has been approved, proceed with the construction of the project as you have planned it. *Do not make any changes in the plan without consulting the instructor.*

8. *As you perform basic things required,* in a manner satisfactory to yourself and to your instructor, *check them* on your sheet, in your handbook, or on a progress chart.

9. Have your work inspected by your instructor at frequent intervals and in case of doubt as to how to perform an operation correctly, get assistance before your work is ruined.

10. Submit your completed project, together with the plan sheet, for final inspection and rating before you apply finishing material of any kind.

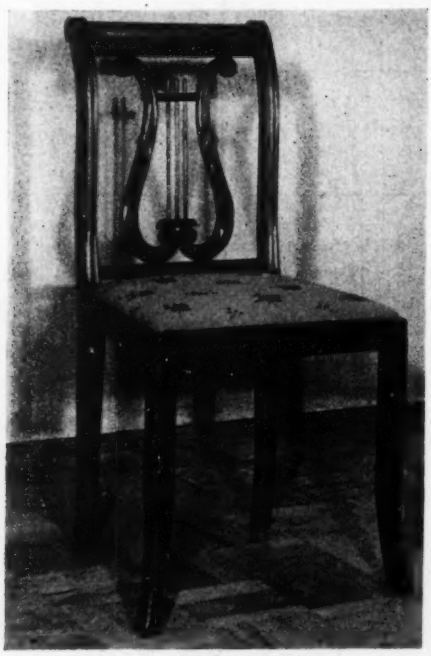
Problems and Projects

DUNCAN PHYFE DESK CHAIR

Earl Harmes, Shorewood High School, Shorewood, Wisconsin

(For working drawings, see pages 291 and 293)

"Which kind of chair should I use for my desk?" This question, no doubt, has been asked by almost everyone owning a desk. The dining-room chair has been used on occasions, but, of course, the proportions are wrong. The ideal desk chair is much smaller and more refined in line. This is important because the chair is only part of the desk arrangement. If the chair seems to project out into the room or disturb the balance of the desk, it simply means that the harmony which should exist between desk and chair is lacking.



Duncan Phyfe desk chair

The accompanying photograph illustrates a chair which will please any desk owner. Compare the dimensions with that of the average chair. Throughout, the general proportions have been reduced to give the refinement necessary for a desk chair.

The construction of a chair seems to hold a hidden horror for the average student or craftsman. But a study of the drawing will show that there is nothing to be worked out; it is all thoroughly detailed, piece by piece. It is no longer a question of "Can it be made?" If you can make one piece, you can make them all. As far as the assembling goes, it is no more difficult then the average table.

The simple carving on the lyre back is not beyond even the beginner. After the pattern has been traced on, use a ⅛-in. V tool and line the design. The acanthus leaf used on the Duncan Phyfe lyre-back chairs is of the simplified type, in fact quite similar in design to a holly leaf.

The seat construction is of ⅜-in. panel, padded with a scant 1 in. depth of hair and covered with imitation white leather.

The kind of wood used may, of course, be either walnut or mahogany.

As a project for the high-school or college shop, it is ideal in that it covers most operations general to school cabinetwork.

BRAZING A BAND SAW

U. L. Hiatt, Director of Manual Arts, La Junta, Colorado

In using what are termed "narrow band saws," one must expect them to break. There are a number of reasons why this will happen. Should a machine break its band soon, look the machine over to see if the wheels are in alignment, i.e., one exactly over the other. If not, they must be adjusted. The lower wheel is the drive wheel and the upper one is an idler. It is so constructed that it may be tilted so as to make the saw run in the middle of the rim. The saw should run here without any great aid from the guide wheel. Undue pressure on this wheel on the back of the saw will cause crystallization and an undue amount will cause breakage. Should the upper wheel be tilted too much, thus making the back of the saw run against the guide, not only will the tooth edge be stretched, but small cracks will appear at the bottom of the V. Should the saw be stretched as stated, it will weave in and out and it will be a difficult task to saw near the line. A saw in this condition is worthless. Do not mistake a dull saw for a stretched one, as the dull saw will weave badly. It is good practice to keep band saws sharp, because the use of a dull saw forces it back against the backing wheel, thus helping to crystallize the band.

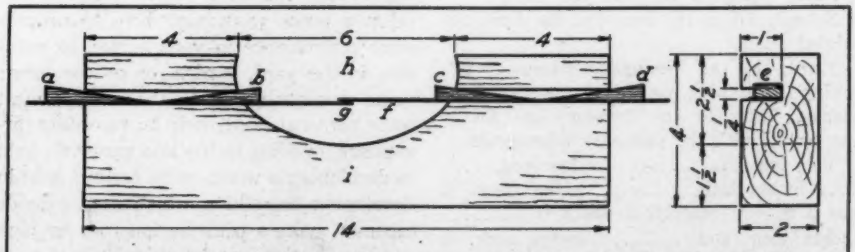
The band-saw wheels are covered with a special rubber covering and should be kept clean of sawdust and other material that may stick to them. If they are not kept clean, the even bend and wear of the band will be increased. There are patented band-wheel coverings that may be applied in a very few minutes. These coverings should not be permitted to become hard, nor should they be used if broken places develop in them.

Because of the speed at which a saw runs, keeping the track smooth and clean will greatly reduce the wear. The recommended speed of the narrow band saw is about 3,500 ft. per minute. The correct tension for ¼-in. and ⅜-in. band saws is, respectively, 55 and 100 lbs. The tension may be learned from the sound of the vibrations when the saw is plucked with the thumb or finger. Too great tension causes undue wear, not only on the saw itself, but also on the rubber covering of the band wheels and bearings of the machine.

The recommended gauge of saw for very small wheels is 28. When ordering, be sure to give the diameter of the wheels.

To prepare the band saw for brazing, gently hammer out any curve or wind that may have developed in the saw from the breaking. File each end of the saw to what is called a "feather edge" so that they will lap the width of one tooth or more without having a thickness greater than the gauge of your saw. This filing will appear as a wedge and must be on opposite sides of the saw in order to keep the band out of a twist. Place the band saw with the end very near the end of a hardwood strip, using a 10- or 12-in. mill file, filing with a sweeping stroke over the end. This will help to file the ends to the correct bevel so they will fit together.

Three things are now needed for the brazing: A pair of good pliers, a blow torch, and a form to hold the saw. This form may very easily be made from a piece of wood 2 by 4 by 24 in. by sawing or plowing a groove in one side about 1 in. from the edge and deep enough to receive the band saw. This makes it possible to keep the back of the saw straight while it is being brazed. The saw may be held in place by using the wedges *a*, *b*, *c*, and *d*, as shown in the illustration. In the middle of this block, cut out a notch large enough to give working space for pliers and torch. The ends of the saw should be placed near the center of this cut-out space. See that the back of the band is against the



WOODEN BLOCK TO HOLD BAND SAW WHILE BRAZING. a, b, c, d AND e, WEDGES IN PLACE; f, BAND SAW IN PLACE. g, JOINT OF BAND SAW READY FOR BRAZING. h SHOWS NOTCH CUT OUT GIVING WORKING ROOM. i, MATERIAL THAT MAY BE CLAMPED IN BENCH VISE.

I.A.V.E.

bottom of the groove, allowing the filed ends to overlap just as they were filed. Treat the joint with a drop or two of muriatic acid, place a piece of silver solder two or three times the size of the joint between the filed ends and add a pinch of borax to act as a flux. Apply the torch and let the saw come to a light red color. Be very careful not to overheat the band saw. With the pliers, firmly pinch the joint together, holding the "pinch" long enough for the joint to stick. It will be advisable to remove the heat while working with the pliers. Do not permit the saw to cool too rapidly, or it will become too hard and brittle and it will be very difficult to dress the brazing. When cool enough to handle, file the joint to the gauge of the saw. It is well to lay the band on a strip of hardwood while filing the joint.

File out the teeth that may have filled with solder. To temper the band at the weld, place a few drops of machine oil on the band at the joint and carefully heat until a light straw color appears. Be careful not to have purple ends of the tempered part as they indicate too much heat. Now place the saw on a smooth base, and with a smooth hammer, or preferably a rawhide mallet, gently tap along the treated part. Fold the band saw, and if a good job has been done, it will conform to the shape of the rest of the band. If it is thin, it will show a sharp bend, while if too hard and too thick a "straight" will show. When sawing, the joint should pass through the wood as freely as any other part of the saw. If a thumping is noted, remove the band and redress the joint and notice if the back of the saw is straight by laying it unfolded on the floor.

With a few practice brazes, one should be able to do his own repairwork. A carelessly brazed band saw is dangerous, of course, but a carefully brazed one is an accomplished trick everyone is not able to do.

FLUTING JIG

E. W. Walker, City Schools, Dothan, Alabama

The fluting jig shown in the picture was made to be used with one of the many routers now on the market. The jig cost less than one dollar and required less than two hours' time to make. It does excellent fluting. The stock to be fluted must be placed between the live and dead centers of the lathe.

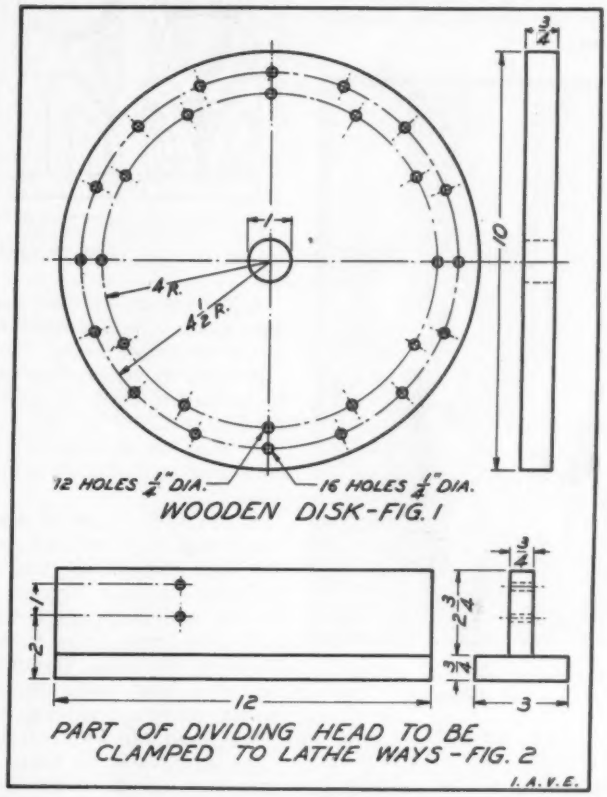
The Dividing Head

The dividing head is made by fastening a ¾ by 10-in. diameter disk of wood to a faceplate and boring a hole through the center large enough for the live center to slip through. Then an 8-in. and a 9-in. circle is scribed on this disk. The 8-in. circle is then divided into 12 equal divisions, and the 9-in. circle into 16. Through each of the points thus laid out, a ¼-in. hole is bored. (See Fig. 1.) The 12-hole circle can then be used for making 6 or 12 flutes per leg, and the 16-hole circle for producing 8 or 16 flutes. For indexing, clamp to the bed of the lathe two boards fastened together with screws as shown in Figure 2. Holes ¼ in. in diameter are drilled through the upright piece so that a ¼-in. dowel pin can be slipped through the wooden disk into the upright piece clamped to the ways of the lathe. The holes in this piece must be directly under the live center.

Jig for Holding Router

To a 3 by 9 by 18-in. block, fasten another 2½ by 4 by 9 in. This second block should be so shaped that the router fits snugly into the recess. (See Fig. 3.) The router is then screwed to the smaller block by two screws through holes in the base of the router. It is essential that the bit of the router be in line with the line of centers of the lathe. For example, if the lathe has a 12-in. swing, then the center of the bit of the router must be 6 in. above the ways of the lathe.

The router bit is next adjusted about 3/16 in. through the *post*. This *post* is a cylinder ¾ in. in diameter and 8 in. long. A ¾-in. hole, 2 in. deep is drilled into the large block for the post to fit into. The post acts as the depth gauge for the fluting, and the bit must be adjusted to extend only the desired distance through it. The post is flattened a little on the side next to the base of the router. The depth of the flute is controlled by adjusting the router unit in the router base. In Figure 3, the router is turned at an angle so that the



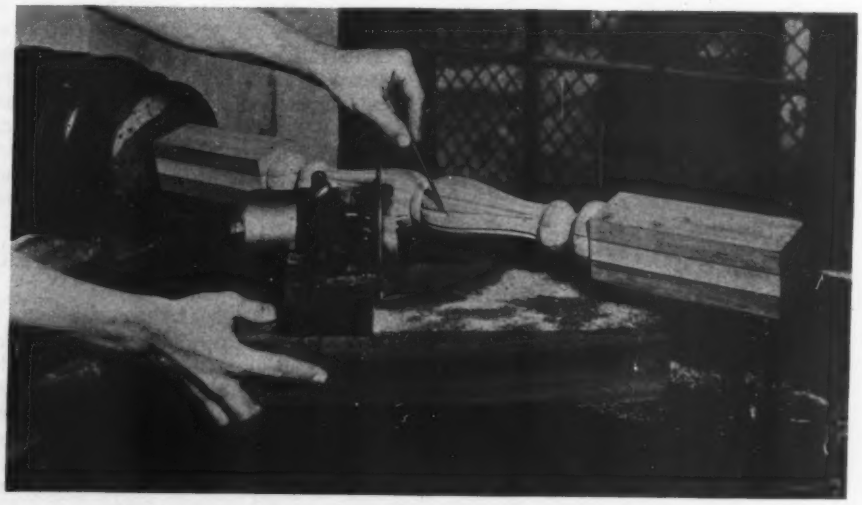


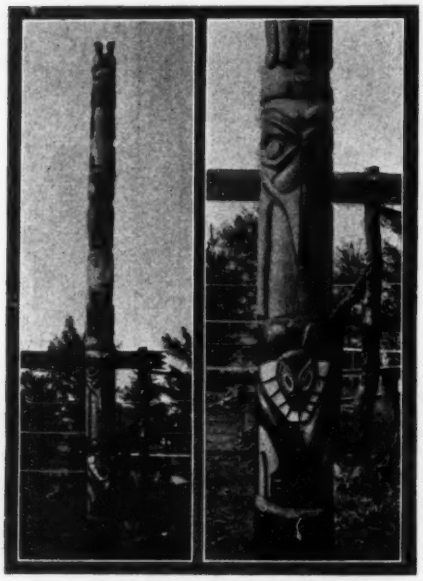
Fig. 3. The router holder

post and the point of the fluting bit can be seen.

TOTEM POLE

Clifford L. Yard, Junior-Senior High School, Hastings-on-Hudson, and Crafts Counselor, Bonnie Brae Camp, Millington, New Jersey

This attractive totem pole is the result of the co-operative efforts of a group of boys from eight to fourteen years of age who were attending the Bonnie Brae Camp. The camp was being renovated in an Indian manner and the suggestion was made that a totem pole placed on either side of the entrance to the council ring would be a most appropriate contribution of the campers to this camp-improvement project.



The finished totem pole and a close-up of one of the details

Two black-oak logs, 20 ft. long, 14 in. in diameter at the bottom, and 11 in. at the top, were obtained from a near-by sawmill. The bark was removed in preparation for carving.

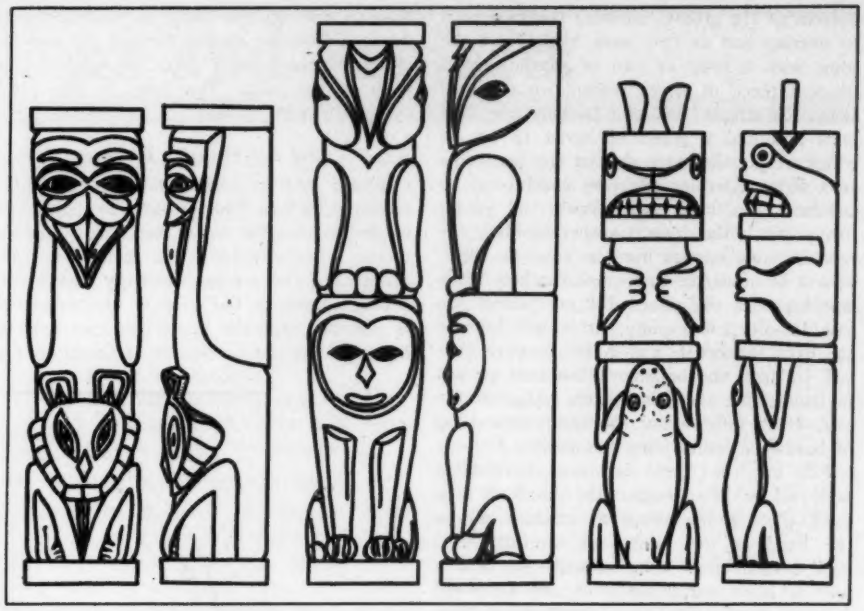
Procedure:

1. The desired lengths were laid out, allowing the necessary 48 in. for setting into the ground.

2. The designs were drawn by the writer with the assistance of several of the campers, in the following manner: Large sheets of common brown wrapping paper were wrapped about two thirds of the way around the poles to determine the width of the full-size patterns. Then these patterns were laid out indicating only the major lines.

3. The full-size patterns were tacked to the pole in the proper position, their centers coinciding with the center line previously drawn the full length of the pole. This assures the proper alignment of the several figures.

4. The major lines were then transferred to the pole by chiseling right through the pattern and into the wood, the cuts being about 2 to 3 in. apart so as not to destroy the pattern.



Designs used on the three sections of the totem pole

5. The pattern was then removed and the lines chiseled in V-shaped and to approximately the proper depth.

6. Next, the various areas were roughed out to the proper depth to secure plenty relief for each part.

7. After the roughing out was completed, smoothing and addition of details were attended to.

8. The pole was painted two coats of bright contrasting colors and then set in the ground. The final coat of paint was applied and the unveiling ceremony climaxed a most successful and interesting piece of healthful activity.

It took between three and four weeks to finish the two poles. The campers were permitted to work under the direction of the writer, when and as long as they pleased. They found this an excellent way to whet their appetites for a hearty camp meal, or a pleasant way of consuming time that begins to drag. The expected gratification on the big day when the poles would be erected at the entrance to the council ring was an automatic incentive for diligent participation. The values gained through active and voluntary participation in this project will certainly be a pleasant memory of camp life for a long time, and the boys were not the least aware of what they derived in terms of designing, tool manipulation, co-operation, industry, and social competence.

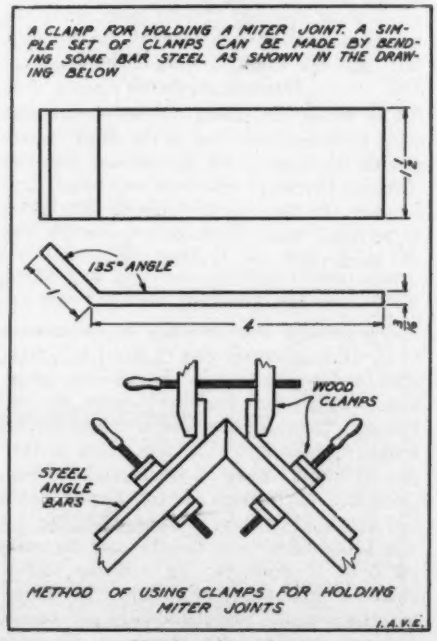
CLAMPS FOR HOLDING MITER JOINTS

H. H. Braucher, Urbana, Illinois

The old method of gluing miter joints involved the gluing of triangular blocks to the pieces to be mitered and holding the glued joint together with some form of hand clamps. The method is illustrated in many of the older books on woodworking and is familiar as the practice of the early craftsmen in solving their clamping problems.

The simple device or jig illustrated herewith, serves as an excellent substitute for this old method. It can be applied to most pieces joined by miters and does away with the trouble and delay involved in the use of glue for holding the blocks in place. Its simplicity, speed, and efficiency seem to justify bringing it to the attention of other shop teachers who may have use for it.

The angle bars are made of 1½-in. bar steel, thick enough to withstand the stress necessary to hold the work in place. We have found ⅛-in. to 3/16-in. stock ample for the purpose, but with boys who are likely to use more muscle than judgment in applying the clamps, heavier stock may be required.


A CLAMP FOR HOLDING A MITER JOINT. A SIMPLE SET OF CLAMPS CAN BE MADE BY BENDING SOME BAR STEEL AS SHOWN IN THE DRAWING BELOW
135° ANGLE
4
WOOD CLAMPS
STEEL ANGLE BARS
METHOD OF USING CLAMPS FOR HOLDING MITER JOINTS
I.A.V.E.

Simple miter clamp

Heavier stock will need to be heated in bending to the angle of 135 deg., but the lighter stock may be bent cold if the work is done carefully. A vise and hammer are about all that is required unless one needs a miter jack to get the angle.

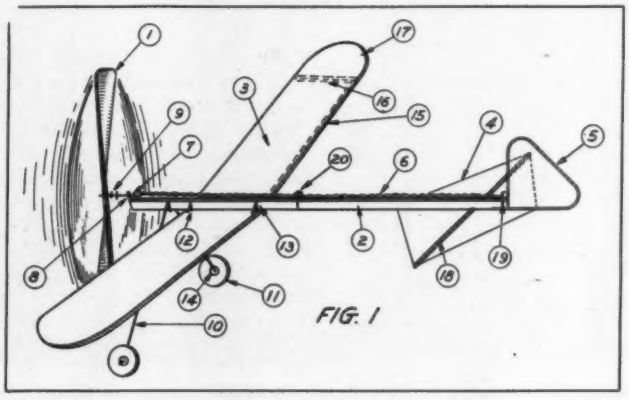
In clamping joints for thin stock where the face of the joint is necessarily narrow, it will be better to use some form of frame or jig to hold the pieces at right angles while the glue sets, for unless the clamps are adjusted very accurately, they will tend to spread the angle and make it larger. A little thought and ingenuity will suggest several simple ways of overcoming these difficulties.

R.O.G. MODEL AIRPLANE

G. H. Silvius, Post Intermediate School, Detroit, Michigan

The job sheet presented herewith is so organized that the builder will find each part of the R.O.G. (rise off ground) model airplane separately illustrated and described. In this way, he can build the separate parts as he comes to them in the order of procedure. Then, after he has made all the details, directions for assembling and flying the plane are given.

The assembly, with all parts numbered, is first given, as this helps the beginner to identify the parts and their relation to one another. (See Fig. 1.)



Assembly of R.O.G. model airplane

1. Propeller
2. Motor stick
3. Wing covering
4. Elevator
5. Rudder
6. Rubber motor
7. Propeller shaft
8. Thrust bearing
9. Bead and washer
10. Landing-gear struts
11. Wheels
12. Front-wing clip
13. Rear-wing clip
14. Balsa disks
15. Wing spars
16. Ribs
17. Wing tip
18. Elevator spar
19. Rear hook
20. Can

Tools Needed

Knife	Sandpaper
Round-nose pliers	Compass
Razor blade	Flexible steel rule

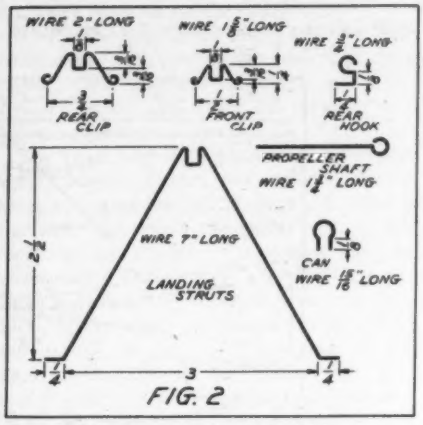
Tools to Complete a Desirable Kit

Half-round-nose pliers	3-in. block plane
Cut-off pliers	Assorted sandpaper

Method of Procedure

Wire Parts

1. Cut the pieces to the desired lengths for the parts.



Wire parts for model airplane

2. Bend into the proper shape. Do not try to make a complete bend at one twist of the pliers. Work the wire a little at a time around ends of pliers.

Fuselage

The Motor Stick

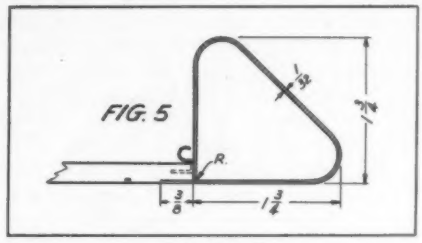
1. Sand ⅛ by 3/16 by 9-in. balsa motor stick. (Use sandpaper block.)
2. Cut off front of motor stick 1/16 in. at bottom as shown.
3. Cement thrust bearing in place.
4. Fasten and cement rear hook in place.
5. Fasten and cement can in place.

Elevator Spar

1. Split and sand bamboo spar 1/32 by 1/32 by 4 in.
2. Cut joint ¾ in. from back of motor stick.
3. Cement spar in place.

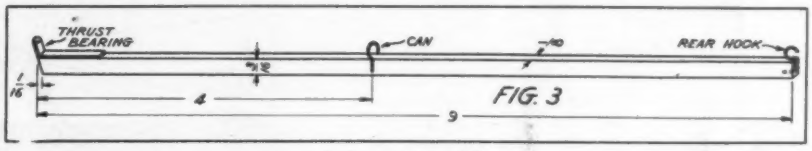
Rudder

1. Cut a piece of 1/32 by 1/32 by 6 3/16-in. bamboo.
2. Bend with steam, forming shape shown in Figure 5. Measure off distances where bends will be made and indicate on bamboo with pencil before bending.
3. Glue rudder at R, as shown in Figure 5.
4. Notch the rear end of motor stick to set bottom of rudder flush with bottom of motor stick.

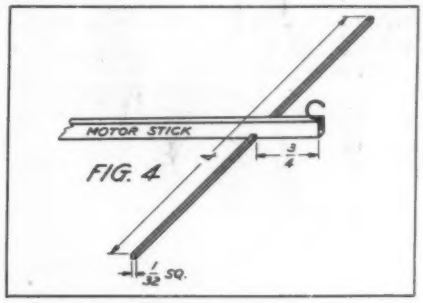


Rudder

5. Paper rudder. With small paint brush or swab, cover one side of rudder with banana oil. While this is still wet, lay on piece of paper. When dry, trim off excess paper with sharp razor blade. The swab may be made of a piece of cotton placed on end of toothpick.
6. Set rudder in with plenty of glue. Bend the rudder slightly before the glue sets so plane will circle to the left.



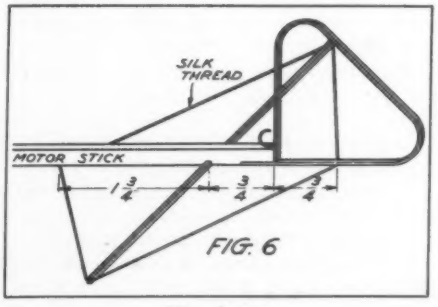
Balsa motor stick



Elevator spar

Elevator

1. Measure 1¾ in. forward on motor stick from center of elevator spar joint. This distance is marked on bottom of motor stick. (See Fig. 6.)



The elevator

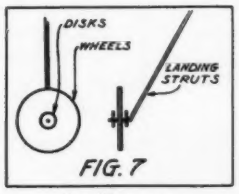
2. Measure back ¾ in. from end of motor stick and place mark on bottom of rudder.

3. Fasten silk thread by gluing on bottom of motor stick and rudder to form a diagonal shape around ends of elevator spar, as shown. More experienced builders may eliminate this step to cut down weight.

4. Paper the elevator in the same manner as was done with rudder.

Landing Gear

1. Make two ¾-in. balsa disks for wheels. (See Fig. 7.)



Landing gear

2. Make four small disks 3/16 in. in diameter to glue on axles to hold wheels.

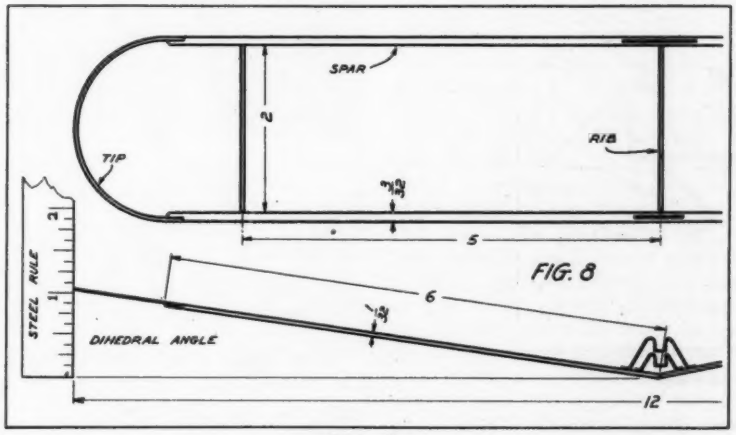
3. Fasten wheels on landing struts, with disk on inside and outside of wheel cemented to wire. (See Fig. 7.)

Wings

Tips

1. Cut two pieces of 1/32 by 1/16 by 4-in. bamboo.

2. Bend tips. Either of the two following methods may be used for the bending (see Fig. 8):



The wing

Heat a 2-in. pipe and bend bamboo tips around it. Be careful not to burn bamboo. Or,

Set a compass for a 1-in. radius and draw a circle on a piece of paper which is glued to a board. Place ½-in. brads on inside and outside of this circle, making a form for bending the tips after they are steamed.

Spars

1. Sand two pieces of 1/32 by 3/32 by 10-in. balsa. Use sandpaper block.

2. Measure and find center of each and mark with a pencil.

3. Fit ends of spars to receive tips.

4. Bend dihedral angle in either of the following two ways: Steam spars and bend in center. Testing is done with steel rule, as shown in Figure 8. Or,

Cut spars in center and glue together at proper angle. (Allow spars to dry well before assembling wing.)

Ribs

Split and sand three pieces, 1/32 in. square by 2-in. bamboo for ribs.

Assembling Wing

1. Draw two lines 2 in. apart and 12 in. long on paper.

2. Draw lines indicating where ribs will be placed.

3. Place one spar on outside of each line.

4. Glue ribs in place. (Be careful that outside ribs are *exactly* the same distance from center.)

5. Cover wing with Japanese tissue paper. If paper is wrinkled, place it between two sheets of paper and iron smooth.

a) Spread banana oil for distance of 2 in. on frame.

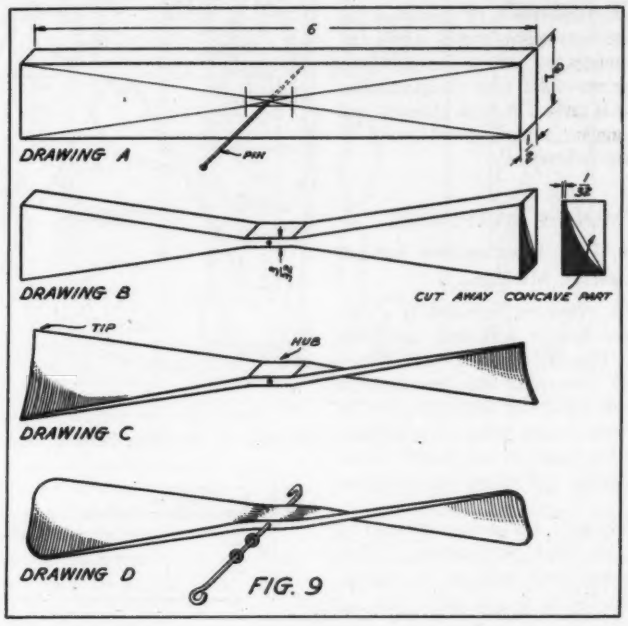
b) Place paper smoothly on surface covered with oil. (Banana oil dries rapidly.) Work a small surface at a time.

c) Trim edges with razor blade.

6. Glue wing clips in place.

Propeller

1. Draw diagonals on wide faces with a sharp pencil. (See A in Fig. 9.)



The propeller

2. Draw two lines on each of these faces ⅛ in. apart, at the center as shown.

3. Punch hole with pin for propeller shaft. Punching in half way from each side, insures hole being perpendicular to faces.

4. Cut block to diagonals as shown at B.

5. Draw curved diagonals on ends of block, in opposite directions as shown at C.

6. Cut away and sand concave sides above end diagonals.

7. Cut away and sand wood below and diagonals, tapering blade from 3/32 in. at hub, to 1/32 in. at tip.

8. Round corners of blade to desired shape. (See D, Fig. 9.)

9. Balance exactly on wire by sanding heavy blade.

10. Push shaft through propeller. Bend end *from you* into square which is cemented on top of hub.

Assembling Plane

1. Place bead and washer on propeller shaft.

2. Put propeller shaft through the thrust bearing.

3. Thread rubber motor through can, between thrust bearing and rear hook.

4. Clip the wing on fuselage with small wing clip near front.

Flying Directions

1. Adjust plane until model will glide evenly to floor when released from hand. *Don't push.*

2. The propeller has a tendency to turn

the plane over. In order to overcome this, the wing is placed at mouth of flyer and by breathing on it, the left wing is bent slightly down and right slightly up. This is called "wash in and wash out."

3. Wind propeller about 200 turns.

4. Try out.

a) If plane dives, push the wing slightly forward.

b) If plane stalls, pull wing back.

5. After successful flight, mark location of wing on motor stick.

CANING A CHAIR AND MODEL CANING BOARD

L. N. Cilley, Western State Normal School, Gorham, Maine

Caning a Chair

Cut away the old caning and drill out the old holes to a diameter of at least 3/16 in. Countersink the holes slightly to prevent the cane from breaking.

Count the holes on the back and front edges and start filling in from the center holes toward both sides having the cane well soaked to be pliable. Use a plug to hold the end and another to follow up the weaving strands to keep them tight. Do not weave too closely to the sides and keep the strands parallel by skipping some of the holes if necessary.

Next weave across from side to side usually starting at the back and going toward the front.

Then weave another strand directly upon the first one, only tend to place them all on the right or left side of the first strand.

Follow this by weaving a strand parallel with the second one, weaving it under the first and over the third strands either toward the front or behind all the second strands.

Next weave a diagonal strand starting near a corner and going toward the opposite corner. This strand will always be under the cross double strands and over the front to back double strands or vice versa as the previous weaving was done. This strand weaves very neatly and smoothly as it tends to slip under some of the strands. Sometimes it is necessary to enter the same hole twice to keep the strand straight and usually it will have to be twice in the square corner holes.

Next weave the opposite diagonal the same as the other one entering the same corresponding holes twice as on the other side.

The next step is to fasten all the ends underneath, first wetting them to make them pliable. Then roll them three times over a flat strand near by, and finally cut them off with ⅛ in. projecting.

The next step is to bind it off with wide caning using a medium piece to loop over it. Start in the middle of the back side, placing the wide cane down flat, shiny side up and loop the other over it, fastening one end underneath. Then carry the binding cane underneath and up through the next hole and over the wide cane using a round pointed awl to roll the cane over to obtain all the slack underneath. At the corners the wide binder cane can be shaped around and continued without cutting, letting it lap over at the end for a hole or two, or, it may be cut and put down through the corner holes and the next side started similar and then a dowel driven in the corner hole to fasten it. Then apply two coats of shellac.

Notes:

Always keep shiny side of the cane up.

In weaving the last three steps or where there is any real weaving run the finger along the strand to feel for the joint so as not to weave against it and cause a great deal of trouble by breaking.

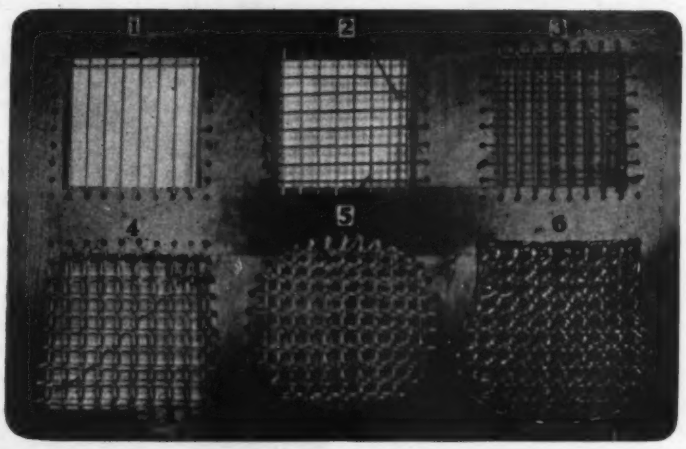
In starting with a new strand after there are a few loops underneath, tie the new strand by looping it once under a loop and make it bind itself.

In weaving from the fourth step and on to the finish, weave with a short end and pull the strand along as you need it, keeping one hand on top and the other on the underneath.

Cut away any weak sections so as not to weaken the seat when done.

After the fourth step is woven, move the double strands together with an awl to help in weaving the fifth step.

Whenever possible, weave both ways from the center of a long piece of cane.



Model Caning Board

Model Caning Board

The accompanying illustration is that of an exhibition caning board. It is a great aid in teaching caning to supplement individual instruction by having something which the individual student can study.

The board shows each step clearly so that the beginner will be able to advance easily even when caning the odd shapes. The last chair opening is completed to show the two possible methods of binding off. On the reverse side of the board may be seen how the pieces of cane are spliced and how the ends are fastened.

The board also is helpful to the student who is laying out the drilling for new work.

METAL BOOK ENDS

Richard De Forest, Junior High School, Tuckahoe, New York

Note: This is a job sheet on a pair of art-metal book ends. This is a good project for an eighth-grade boy as it involves several operations and processes used in art-metal work.

Job Sheet

Name of Job: Book Ends
Grade: Eight
Prepared by: Richard De Forest
Date: January 6, 1938

Objectives: To make a useful project from sheet copper involving design peening.

Specifications: Copper is soft, so be careful not to scratch the face of the book end.

Stock Order: Two pieces of 20-gauge copper, 5 by 8½ in.

Materials: (1) Steel wool; (2) clear lacquer.

Special Tools: (1) Medium file; (2) scriber; (3) center punch; (4) scale and square; (5) tin snips; (6) peening hammer.

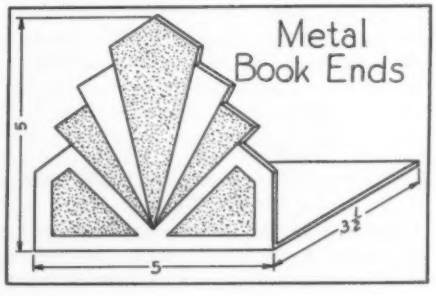
Procedure

1. Get out the stock.

2. Lay out the design shown in the drawing, using the scriber, scale, and square. Then cut it out with snips and chisel.

3. If you find it hard to lay out the design this way, get the protractor and fit the scale to it, and lay out the design in this way.

4. With center punch, punch along the lines coming to the center, each line thus becoming a line of small holes. Of course, the holes are just from the punch and are not imbedded too deeply.



5. After marking it thus, peen as shown in the drawing, using the small peening hammer.

6. After peening, locate where you are going to bend for the base.

7. Bend to the line, using a vise. Use cardboard to protect the copper. The correct angle to bend is 90 deg.

8. Polish up the entire project with steel wool.

9. Apply a coat of clear lacquer and allow to dry.

Questions

1. Why is lacquer applied?

2. Do you like this work? What did you gain from it?

3. Write up an article on laying out work.

References

1. *Metalcraft and Jewelry*. Kronquist, Manual Arts Press, Peoria, Ill.

2. *Metalwork and Etching*, J. D. Adams, Popular Mechanics Co., Chicago, Ill.

3. *Metal Work*, Harry A. Jones, The Bruce Publishing Co., Milwaukee, Wis.

COLLECTING, MOUNTING, AND PRESERVING BLUEPRINTS

Clyde Utz, Bangor, Pennsylvania

Blueprints for school-shop use will be found exceedingly handy when mounted on 3/16-in. wallboard. This may be purchased in 4 by 8-ft. sheets, and cut up on the circular saw into 9½ by 12-in. pieces. This size fits the majority of the blueprints, and also fits into a standard-size filing cabinet, enabling the instructor to place about 100 pieces of the wallboard in one drawer. The blueprints may be mounted with cold-water paperhanger's paste.

It is well to mount blueprints on both sides of the board, in order to conserve space and also to save money. A ½-in. brass stencil set, with cake ink and brush, will be found useful for stenciling the name of the school in the margin along the blueprint.

It is best to round the corners of the mounts on the band saw, and to sandpaper the edges. To make the blueprint serviceable, apply a coat of white shellac to each side.

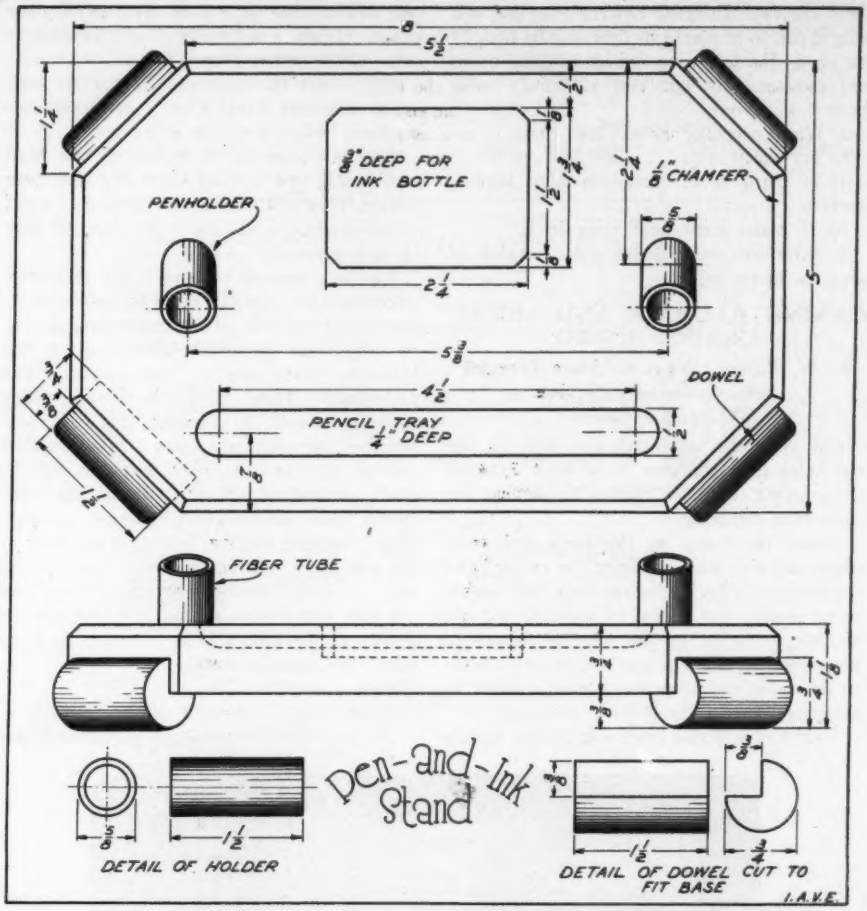
To facilitate the identification of blueprints belonging to a certain class of projects, the edges of the blueprint mounts are enameled in distinguishing colors. Blueprints showing table designs, for instance, were designated with red edges; those showing chairs, blue, and so on. This makes it very easy for the boy in charge of the blueprints to sort them rapidly and to place them in their proper drawer.

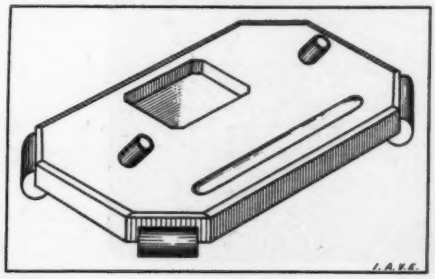
Larger blueprints may be mounted on 2 by 3-ft. pieces of wallboard. Instruction sheets also may be mounted in a manner similar to that used for the blueprints. These instruction sheets may then be divided according to the subject as lathe work, pewter craft, and the like.

PEN-AND-INK STAND

I. M. Fenn, Tilden Technical High School, Chicago, Illinois

The boys in the first-semester woodworking classes have become quite enthusiastic over this project. Since very little material is needed in the construction of this piece, it is a very economical project for the shop.





Pen-and-ink stand

It can be constructed and finished in stain, shellac, enamel, lacquer, or paint in approximately ten 1½-hour periods.

The following important operations are involved:

1. Reading a blueprint.
2. Lay out with try square, dividers, and rule.
3. Squaring with a plane.
4. Sawing with a crosscut, rip and backsaw.
5. Chamfering with a plane.
6. Chiseling space for ink bottle.
7. Gouging the pencil tray.
8. Drilling with a brace and bit.
9. Using dowel rods, sandpaper, brads, and glue.

After the instructor's explanation of the blueprint, the students found the pen-and-ink stand very easy to make.

TIN-CAN SOLDERING FURNACE

Jos. J. Lukowitz, Milwaukee, Wisconsin

Soldering jobs, such as the one shown in Figure 1, may be very conveniently done with the aid of the simple soldering furnace shown in Figure 2. The heating unit for this furnace may be either a candle as shown, an alcohol torch, or a gas flame. The large-diameter candles used by plumbers are preferable for this work, because they burn with a larger flame. The flame will, of course, deposit a layer of soot on the object, but this can be wiped off with a soft cloth. The base of the furnace is merely a can bottom of larger diameter than the furnace itself so as to give the furnace greater rigidity. The can bottom may be soldered to the furnace with a candle by placing three or four small pieces of wire solder at the joint between can and base and then applying the candle flame under the base directly beneath the solder.

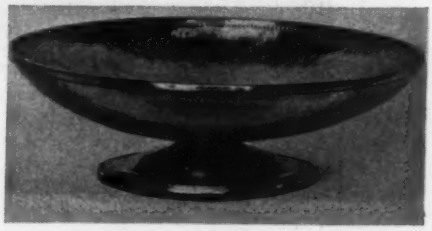


Fig. 1. Candy dish

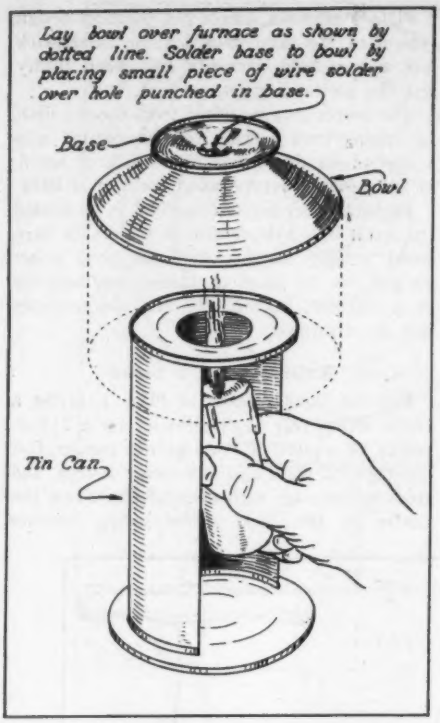

Lay bowl over furnace as shown by dotted line. Solder base to bowl by placing small piece of wire solder over hole punched in base.
Base
Bowl
Tin Can

Fig. 2. Method of using the soldering furnace made from tin cans

The dish shown in Figure 1 was constructed from two tin cans as described on page 283 of the September, 1936, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. The use of a candle and this furnace is not at all limited to this particular type of project. For example, candle sockets may be soldered in place, and many soldering jobs which can be manipulated so that the soot from the candle will not reach the joint can be soldered in this simple manner. Of course, other metals besides tin may be soldered in the same way.

Shops which are not equipped with gas-heated or electric soldering irons will find that this simple arrangement will make it possible to do acceptable soldering. Even where soldering equipment is available, the method described in the foregoing may frequently be found helpful.

A SIMPLE PILLOW LOOM

R. H. Jenkins, Arcata, California

The simple loom described in this article may be used for weaving interesting pillow covers. The loom may be made of waste lumber. It may be simply nailed together, or if a little more permanent frame is wanted, fastened together with the type of joint shown in Figure 1.

This loom might be called a picture-frame loom, as it is made of narrow strips much like a picture frame. The size of this frame should be as large as the pillow to be made, including the fringe around the edges. A good practical size is 20 by 20 in., or 18 by 20 in. For the square, cut four pieces 1 by 1½ by 20 in. Miter the corners and nail together with the 1½-in. face up. If the miter box for cutting the corners is not conveniently at hand, nail the frame together with a plain butt joint. If this is done, it will probably be found easier to turn the piece on edge so as to nail through the wide face of the wood. If the slip joint shown in Figure 1 is used, the pieces should be glued together at the corners.

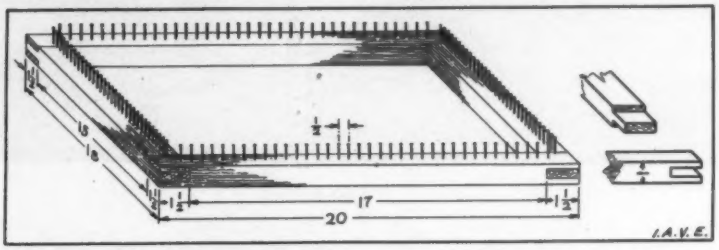


Fig. 1. The pillow loom. This is a very desirable loom as it is the loom upon which the very popular waffle pillows are made. The construction and weaving are very simple, and the results most satisfactory

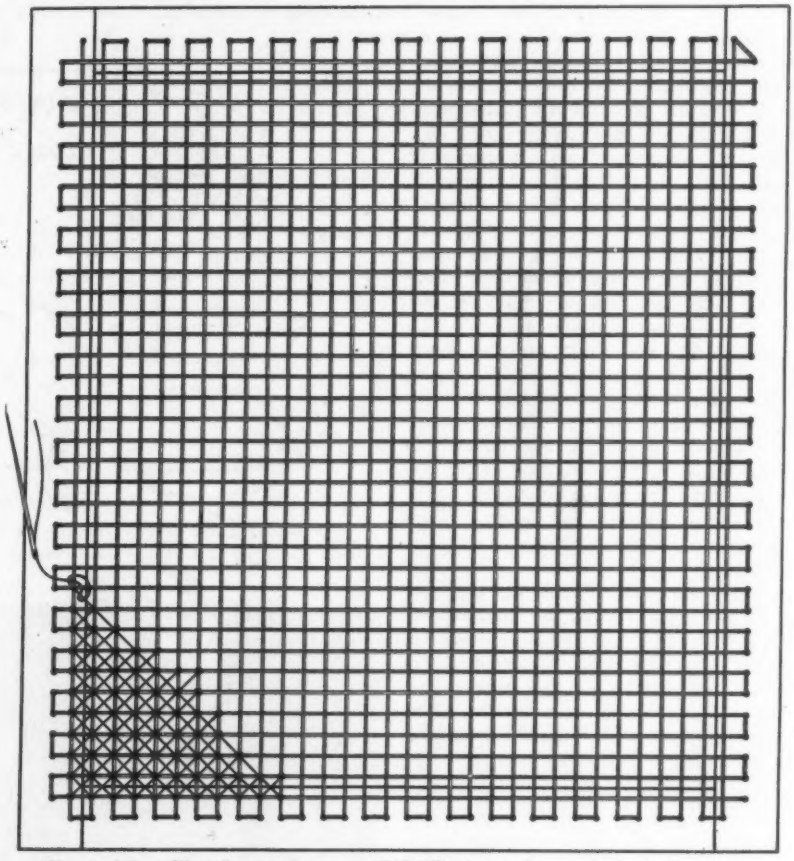


Fig. 2. The pillow loom strung up. This illustrates the method of threading and tying the pillow loom

After the frame is made, one of its faces must be laid out with nails for the weaving. Choose the side that seems best for the upward face of the loom. Starting from the center of the sides, mark off carefully every ½ in. Drive a 3d finish nail or a 1½-in. No. 16 brad into the frame on each one of the ½-in. marks, leaving 1 in. of the nail remaining above the surface of the wood.

Weaving On the Pillow Loom

To weave on the loom, one must first decide on the type of material and the size of the mesh to be made in the weaving. The smallest mesh, with the nails ½ in. apart, is a ½-in. square mesh. However, as much larger than the ½ in. as desired can be made. The only condition is that the size must be chosen at the beginning. The next question to be settled is the length of the fringe. This may run from ¾ in. to any length desired. For example, for a pillow cover with ½-in. mesh and 2¼-in. fringe, count from one corner over to the fourth nail, and tie the end of the weaving material (in this case yarn) to this nail. Run the yarn directly across the loom to the nail located in the same position on the opposite side. Pass around this and the ½-in. nail next to it. Return to the beginning side and go around the next two ½-in. nails. Continue this process until the 2-in. point is reached on the opposite side. From the 2-in. point, cut across the corner to the nail on the other side of the loom. Pass around

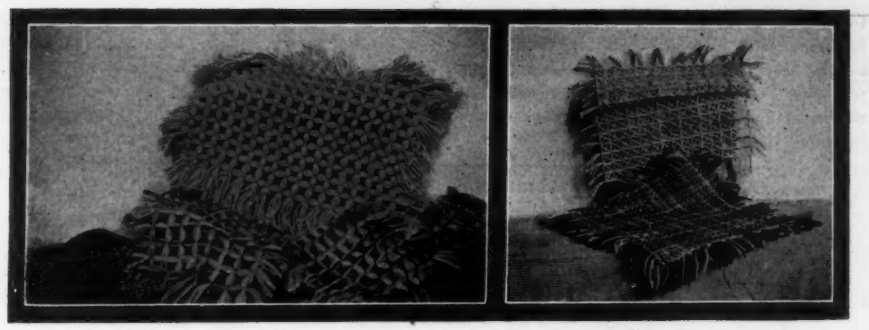


Fig. 3. Waffle pillows

the nail that is 2 in. from this corner and cross the loom in exactly the same system. Cover this side and then cross back to the first side and repeat the process. Continue to string back and forth until a thick layer of yarn is piled up on the loom. String a needle with yarn and, beginning at one corner, tie each square where the yarn crosses. This can be done with a type of overcast or chain stitch. Tie well to the first square and then run the needle under the next square and up through and around the cross. By placing the yarn around the needle, a type of simple knot is formed. Do not cut the yarn but carry on to the next square. (See Fig. 2.) The tying gives an extra thread on one side of the pillow cover, but it does no harm as it can be put on the inside when the pillow is made up.

In the tying, the work can be done diagonally, instead of straight across, which will add another touch to the effect, especially if tied both ways diagonally. Another effect may be obtained by making 1-in. instead of ½-in. meshes. This may be done easily by passing the thread each time around the third instead of the second nail. Still larger meshes may be made by a proportionate increase in the number of nails used.

A number of interesting objects may be woven on this type of loom. For example, by making a frame 27 by 51 in. and using rags instead of yarn or string, a rug may be made which is both attractive and serviceable. Sweaters and scarfs may be woven by older students, while hot-dish holders and doilies are within the range of smaller children.

COPPER CANDLESTICKS

Leon H. Baxter,
Association for Crippled and Disabled,
Cleveland, Ohio

The Early Colonial Candlestick

Candlesticks and old sconces have an appeal to most people, especially those with a love for the old and unique in craftwork. They certainly have had an important place in the evolution of light from the pine torch in the caves of our ancestors to the modern lighting fixtures of the present day. Even now, candles present a soothing and artistic picture in the table decorations of the modern home. We perhaps are especially interested in the various types of candlesticks of our colonial forebears, those used in the pioneer days of the eighteenth and early nineteenth centuries.

The ten designs shown in this series of articles are authentic. They were observed by the writer in homes and museums of rural New England. In one or two cases a modern touch has been added but the main features of the designs are typical of another day and age.

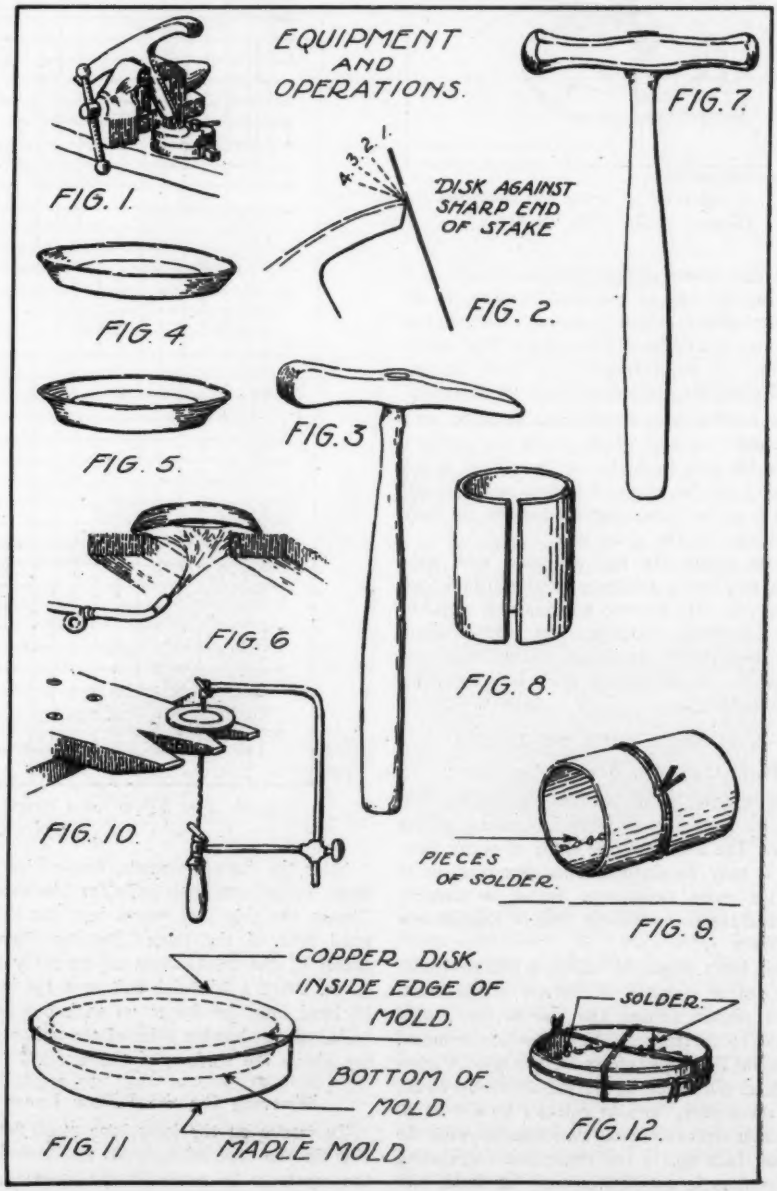
Plate 1 shows a simple but pleasing design typical of the time in which the candlestick was a household necessity and when utility was the outstanding requirement.

The saucer may be raised from the flat disk, by raising over a stake, by hammering into a cupped-out depression in a block of wood, or by spinning over a wood form on a lathe.

Probably the simplest method is to pound the metal into a depression in a block of hard wood, usually maple, which has been either gouged out by hand or turned mechanically on a machine. Both of the first two methods will be described.

Raising Over a Stake

For the candle shown in Plate 1, scribe a circle with a pair of dividers set for a 2½-in. radius, on a piece of 18-gauge soft copper. Cut out the disk with a pair of tinner's snips, and true up the edge with a metal file. From the center of this disk, scribe lightly another



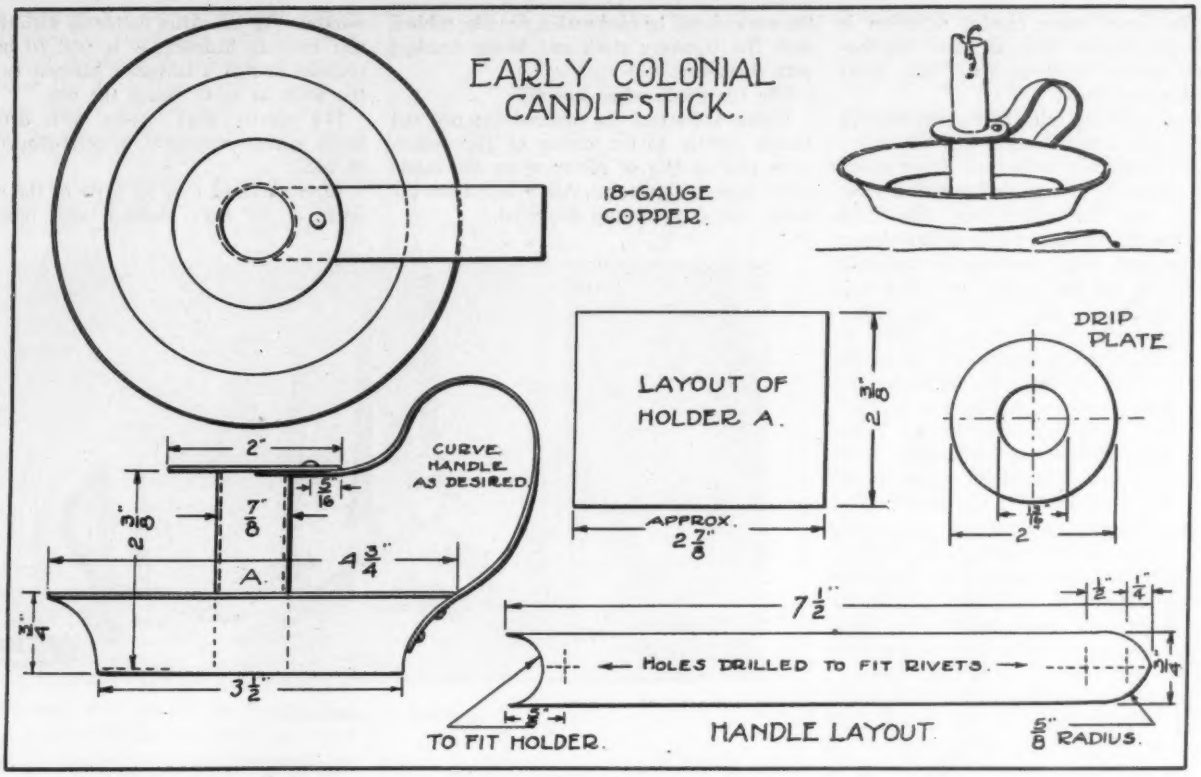


Plate 1

circle with a 1¾-in. radius. This is the outline of the base. A stake similar to the one shown in Figure 1 is placed in a vise and the disk held so that the inner circle is in contact with the end of the stake, as shown in Figure 2. Turn the disk slowly and strike it with uniform strokes of the raising hammer shown in Figure 3, so that at each stroke the stake end is directly below the scribed inner circle.

At the completion of each revolution of the disk, the next series of hammer strokes are a little higher on the metal. This continues until the outer edge is reached. As the hammering progresses, the angle of the disk is raised nearer the horizontal (note Fig. 2), until a shape similar to Figure 4 is obtained. The stake is then shifted in the vise and the work is continued on the rounded end, and the sides of the saucer are concaved as indicated in the front view of the drawing. (See also Fig. 5.)

As the work is being hammered, the copper becomes harder and harder, and must frequently be annealed, or heated, to make it again malleable. To do this, the metal is exposed to heat, either over a gas flame, or by a quicker method of applying heat to the surface with a blowtorch until various colors follow the path of the torch. (See Fig. 6.)

The raising hammer has left rather rough, unsightly marks and now the saucer should be made uniform with the planishing hammer shown in Figure 7.

Next scribe a line around the saucer ¾ in. above and parallel to the base. Cut to this line with snips and file the outer edge square and true.

The drip cup is next made by cutting a 2-in. disk from a piece of 18-gauge copper. Later a hole is cut in the center of the drip cup of a size which will just fit the candle socket A. The drip cup sits upon the socket and the hole must be equal to its inside diameter. Planish the drip cup.

The socket piece A may be made either from a piece of copper tubing having an outside diameter of ⅞ in., or rolled up from a 2⅜ by 2⅞-in. piece of 18-gauge copper. The length may vary slightly as the piece, after being cut roughly 2⅞ in. long, must be planished. This stretches the metal to some extent. The true length is such as will allow an ordinary candle to fit snugly within, after it has been formed and soldered. The two contacting or adjacent edges of A must be square across the width, but beveled slightly inward with a file to insure a perfect joint. (See Fig. 8.)

Raising a bowl over a stake

Clean the contacting edges and apply soldering flux. Wire the cylinder as in Figure 9, and solder by applying heat from below.

Soft Soldering

It may be well to devote some space to the subject of soldering. While hard solder may be used, it is more difficult for the beginner and the soft solder answers all purposes on the candlesticks described in this series.

The commercial *half-and-half* solder (50 per cent tin and 50 per cent lead) is very good, and the type coming in spools, known as wire solder, is the easiest to handle. It is obtainable either solid or with a core of *flux*. This flux dissolves the oxides and insures an even spread of the solder itself.

Of all the fluxes on the market, zinc chloride is as good as any and can easily be made by dissolving small pieces of zinc in muriatic acid or hydrochloric acid. Many firms dealing in art-metal supplies have excellent fluxes at reasonable prices.

One of the most important features in soldering is to have all adjacent parts absolutely clean and bright. Successful soldering

cannot be done unless careful attention is given to this feature. Next, all parts that contact one another must be good tight joints for satisfactory work.

While a soldering iron, or copper, may be used, it is much more satisfactory to have a jeweler's blowtorch of some type, either mouth or foot power. It is best to hammer a short length of the wire solder very thin. This should then be cut into pieces a little larger than a pinhead. After cleaning the underside of the design and the surface on which it is to be placed, apply some liquid flux with a thin, pointed stick, or small paint brush, to the contacting surfaces. Next, pick up on the tip of the brush the small bits of solder and arrange them as shown in Figure 9, and apply the heat. It is important that the metal itself be heated, rather than the solder, so do not direct the flame toward the solder but instead on the metal about it. The heated metal will melt the solder, and this will run readily along the joint and a thorough contact will result. Remove the heat as soon as the solder runs evenly. Pick up the object with a pair of tweezers and cool under water. Dip in a cleaning solution of two-thirds water and one-third nitric acid. This is known as *pickle*.

In making the pickling solution, which is best used in a flat glass dish, be sure to pour the acid slowly into the water. After removing the piece from the pickling solution, it must be rinsed thoroughly, being careful not to get the acid on your clothing.

After drying, rub the piece lightly all over with fine steel wool, after which it is ready for final finishing.

Scribe the required size hole in the center of the drip pan and drill a hole that allows a saw blade to enter. Saw out the circle as described in the following paragraphs. (See also Figure 10.)

Metal Sawing

It is necessary to have some form of holder upon which to place the work while sawing. One made of maple similar to the one shown in Figure 10 is suitable and may be either clamped or screwed to a bench or old table. Insert the saw at the end away from the handle. Place frame against the bench, and by pressing on the handle with the body, insert the other end of the blade and tighten. This insures the blade being tight and firmly held in the frame.

The work is held with the left hand and the saw worked in a perfectly vertical position up and down with the right hand. The saw blade should be inserted in the frame with the teeth pointing downward, or toward the handle, and a very slight pressure used. In turning corners or following curves, the blade must remain vertical, but slowly turned to follow the new direction while the saw continues the up-and-down motion.

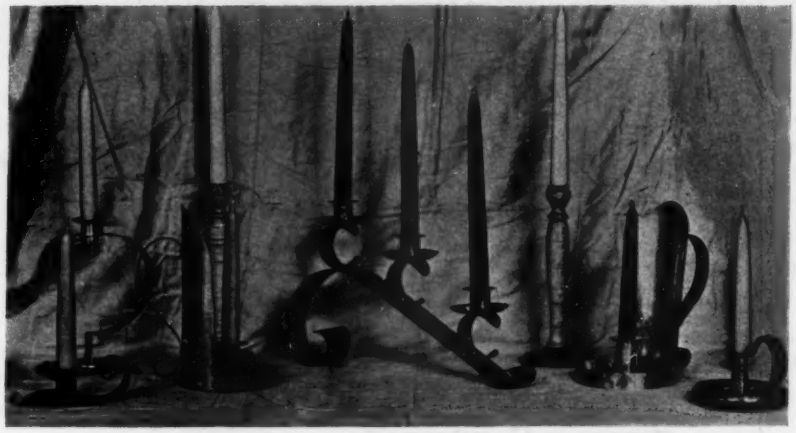
Bearing on hard or forcing the blade around a turn results in broken saw blades. With a little practice, one blade will last a long time.

Keep the fingers of the left hand as close to the saw as possible to prevent the work from jumping.

After the sawing is completed, the edges of the work should be filed with a fine file, rubbed with No. 0 emery cloth and finally finished with steel wool.

File the inside edges smooth.

Locate and attach the soldered drip pan and socket exactly in the center of the saucer, after placing bits of solder along the inside lower edge of the socket. Apply heat from the lower side as previously described.



A group of candlesticks

The handle is next made by cutting a strip ¼ in. wide from a piece of 18-gauge copper. File edges smooth and cut a half circle at one end with a diameter equal to the curve of socket A. Form the opposite end of the handle similar to the drawing. Planish both surfaces, and the long edges. Anneal to soften and bend to curves similar to those shown in the drawing. This may be done in part with pressure of the hands, but should be trued up over a pipe or cylinder about 1½ in. or less in diameter. Take extreme care that the contacting parts of the two handle ends fit snugly against the underside of the drip pan and the outside curve of the saucer. Locate and center-punch holes at the ends, at such places as will hold the handle most securely. Drill these holes with a drill that will just allow a ⅛-in. r.h. rivet to go through. Locate, punch, and drill a similar hole in the drip pan. The rivets should be cut to a length that allows a scant 1/16-in. projection through the two contacting pieces of metal. Rivet as described below:

Riveting

In joining pieces of metal together with rivets, it is necessary that all holes coincide exactly, and that they are drilled slightly larger than the diameter of the rivet shank that is to be used. The rivets should pass snugly through each piece and project not more than a scant 1/16 in.

The heads of the rivets must next be placed on something solid, such as a riveting tool. This tool has a depression in the end in which the rivet head is placed, while the other end of the rivet is hammered flat.

Carefully done, the hammered end is left neat and inconspicuous. A rivet with the shank projecting through the work more than 1/16 in. is likely to turn over and leave a poor, unworkmanlike job. After flattening with the regular riveting hammer, it is well to use the rounded end of a ball-peen hammer to finish the work so as to match the rest.

For special work, rivets with decorated heads, square, hexagonal, or petal-shaped, may be used.

After checking over all parts of the candlestick, it is next cleaned and brightened thoroughly with fine steel wool. It is then ready for fuming.

Finishing

There are many ways of coloring metal, but to the writer none is so beautiful or satisfying as fuming with ammonium hydroxide (strong ammonia).

Variations in color from all shades of brown to blue and green may be obtained by the following method. Secure a stone crock, large enough to easily hold the object to be fumed, and in it place a common drinking glass about one third filled with the strong ammonia. Place the objects upright in the jar and leave overnight. Allow the work to thoroughly dry out, as some moisture usually forms on the surface. The next step is to rub lightly with fine steel wool to bring out the high lights on the raised surfaces. Rub the brass design with fine emery cloth and steel wool until it is bright and clean. Coat all surfaces with ordinary floor wax and rub to a polish with soft cheesecloth. The piece is then complete.

Shaping the Metal in a Wooden Form

The second method of forming the candlestick saucer is to turn a depression in a block of hard maple the exact form of the saucer itself. This is done on a lathe and is a simple operation of which nothing further will be said.

Place the metal, cut to the diameter previously specified, exactly over the center of the form and, using the round end of the planishing hammer, start pounding with uniform strokes about ½ in. in from the edge of the depression. (See Fig. 11.) Continue these strokes with circles of decreasing diameter until the metal begins to shape itself similar to the contour of the form.

Now work back from the original starting point toward the outer edge until the metal shapes itself snugly to the form at all points.

Examine the work carefully from time to time, and correct any inequalities in outline. See that all the planishing marks are evenly distributed and of equal weight. No doubt there will be a surplus amount of metal projecting above the edge of the form. Using a sharp-pointed scriber, scratch a line even with the edge of the form around the outer circumference of the saucer and cut to this line. File the edge of the saucer flat, seeing that the height is uniform at all points. Proceed with the remaining parts of the candlestick as previously described.

(To be continued)

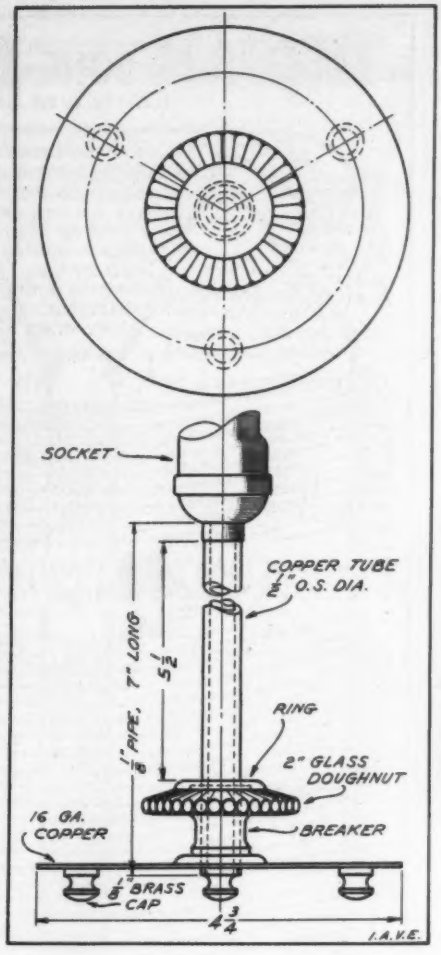
BOUDOIR LAMP

O. A. Northquest, Milwaukee Public Schools, Milwaukee, Wisconsin

Here is a modern lamp that is not expensive and one that any boy above the sixth grade can easily make. Along with the regular list of operations the boy is required to do, a new aspect of our work presents itself, namely, *jobbing* and assembling of the *jobbed* parts. The glass doughnuts, chromium rings, brass caps, and the chrome breaker columns may be bought at a department store selling electrical parts. The manufacturer of lamps buys the parts necessary to make various lamps, and assembles and finishes them. This project gives the boy an opportunity to make a project by a method similar to that used by the lamp manufacturers.

In the making of this lamp, it is advisable to start with the base. It is sawed out with a coping saw and filed to size and shape as shown in the drawing. The top edge may be rounded if desired. The base is then divided as shown in the drawing and the ⅛-in. brass-pipe caps are put in place. Be sure that the copper is clean where the caps are to be soldered. File the tops of the caps to remove the lacquer. Place a small amount of flux on the copper where the cap is to be located, then put the cap in place. Hold this assemblage over a bunsen burner (if one is to be had) until the metal is hot enough to melt the solder. Flatten a piece of wire solder on one end. When applying the solder, just touch it where the cap meets the base, and the solder will flow around the cap. Do not use too much or the cap will float out of place. After the caps are soldered in place, drill a 7/16-in. hole in the center of the base. This will allow the pipe to go through so that a ⅛-in. lock nut may be screwed on the end to hold the assemblage together.

Boudoir lamp



Details of boudoir lamp

Next cut the tube and the pipe to length as shown in the drawing. Square the ends of the tube. Then ream both ends of the pipe and cut threads on both ends.

The copper parts are now ready for the finish. If a raw copper polished surface is desired, merely polish the tube and the base and then apply a protective coat of lacquer, varnish, or wax. If, on the other hand, an oxidized finish is desired, polish the job and then pickle, if a pickling solution is at hand. Next, oxidize it by using barium sulphide. After it has attained a very dark color, wash it and, then, with No. 4/0 steel wool remove the dark color until a desirable color is obtained.

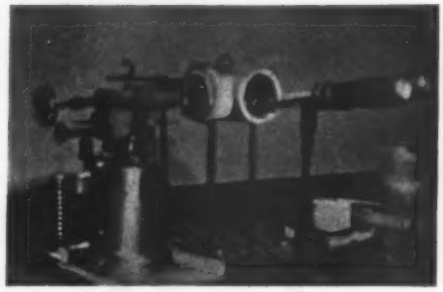
The lamp is then ready to be assembled. This can easily be accomplished by following the drawing. Use a chrome push-through socket for the lighting fixture.

SOLDERING-COPPER HEATER

A. R. Warstler, High School, La Grange, Indiana

Teachers in communities which have no gas supply available might find the following suggestion helpful in their sheet-metal department.

The writer used a 2-in. galvanized tee in connection with a blowtorch (which was already available) as a fire pot in which to heat soldering coppers. The underside of each opening in the tee was drilled and tapped, and pieces of brake rod obtained at an auto wrecker's were screwed in as supports for the tee. The other ends of these rods were sunk about ½ in. into the surface of the bench to provide a steadier support. An end connection of the brake rod, supplied with an extra long bolt horizontally, was mounted on the bench on each side of the tee as a support for the copper handles.



Soldering copper heater

This device will hold one-half dozen or more small coppers at a time. A hinged lid may be attached to one side of the tee so that one opening can be closed when only one side of the *fire pot* is needed.

This device has proved to be an inexpensive and highly effective piece of equipment.

WHY THE SHIFT TO LACQUER?

A. C. Newell, Pasadena, California

World progress has brought about many troublesome and sometimes revolutionary shifts that have eventually been very beneficial to mankind. The discovery of a method of using steam power made man's work easier and more efficient; the telegraph, telephone, and radio brought about rapid interchanges of thoughts, messages, and news. The railroad train, the steamship, the automobile, and airplane have enormously increased the rapidity of transportation. Just as the great inventions from the start of the industrial revolution brought benefits and radical changes so has the evolution of lacquers made shifts in manufacturing methods and developed undreamed-of speed in production.

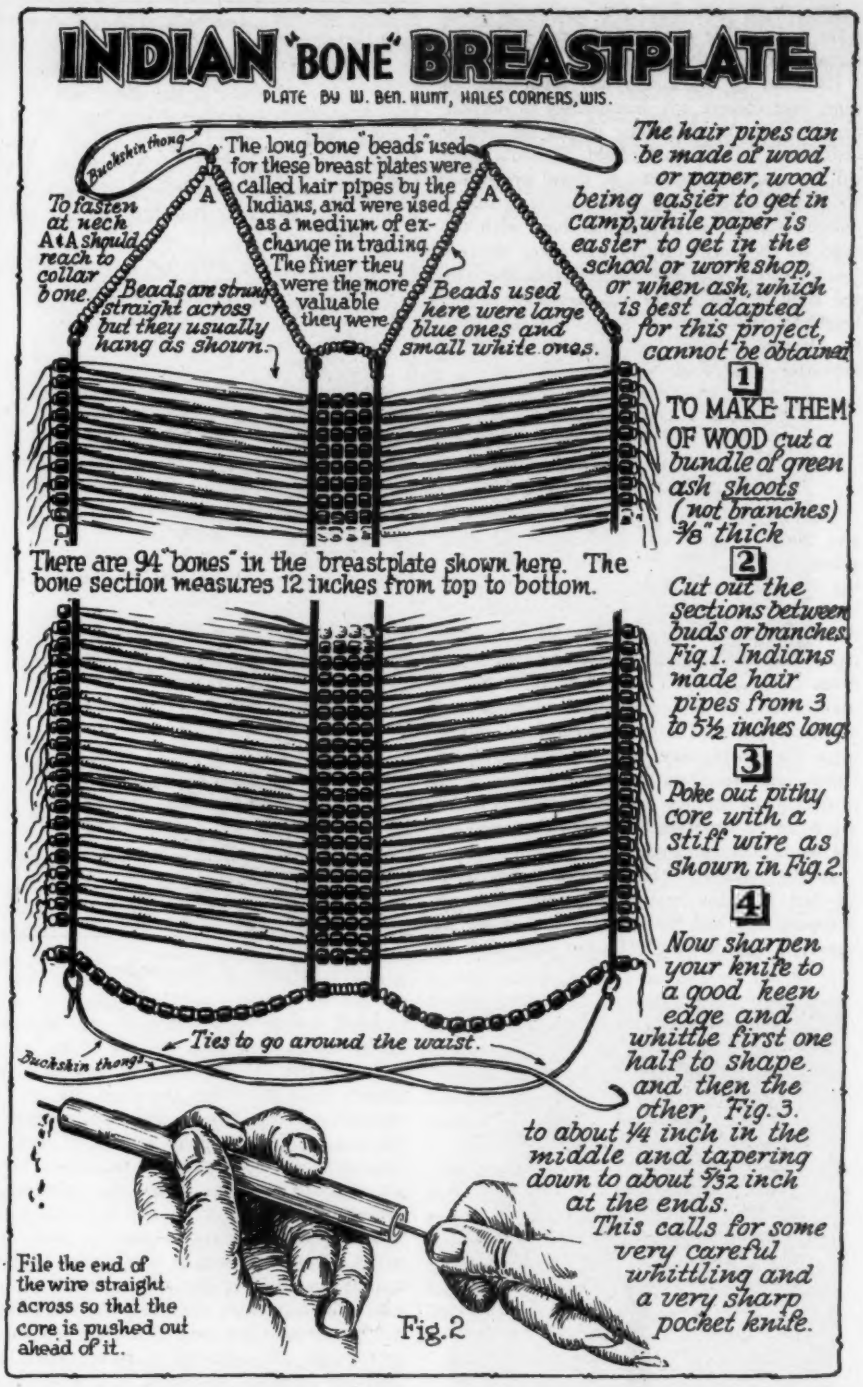
Quick-drying finishes needed. Enterprising automobile manufacturers, in their quest for satisfactory finishes for their products of rapid production, gradually shifted to lacquer after a pyroxylin coating containing colors, commonly called lacquer enamel, was placed on the market in reasonably durable form. They wanted a finish for metal that would dry quickly and yet be durable, as a substitute for the troublesome baked-enamel finishes used on fenders and hoods even up to quite recent times. Finishes of baked enamel meant much equipment — conveyors, ovens — and much time for baking and cooling, together with the expense of having some rather highly skilled and trained labor. After a satisfactory lacquer enamel was produced for automobile manufacturers, the floor space for drying coatings, could be greatly reduced.

The fabricators of wooden and even wicker furniture adopted clear lacquers and lacquer enamels because their use greatly increased speed of production and reduced floor space. The new finishes really offered increased durability in many cases, and the final effects were accepted as artistic, soft, and pleasing.

The steel-office-furniture makers also adopted lacquer to replace expensive baked-enamel finishes because of greater speed in production and reduction of floor space, even though the cost of lacquers at first was higher than that of ordinary enamels or of baking enamels that had been in use for a long time.

World's production methods have shifted. Many of those who occupy a place in this world of rapid production now drive, perhaps a dozen miles or more once or twice a day, in a "tin Lizzie" worth only a song, or they make use of a serviceable automobile which gives cheap transportation and possesses a wide range of usefulness unknown in the horse-and-buggy age. Enormously greater production per man and per factory without expansion in buildings sometimes has been the result of the new speed-up methods of manufacture. Mass production has enabled most people to use articles that were utterly out of reach of the laboring man or person of moderate means only a generation ago. In his experience as a worker at a furniture factory during his young manhood, the writer of this article made a four- or five-mile journey morning and evening. This trip took a full hour or more. Today in an auto the trip would take only 15 or 20 minutes at most. The great change that catches the eye about almost every factory is the great parking space that must be provided for the cars of the workers.

Lacquer has aided in speed-up. While there are many factors that have speeded up production, rapid-drying spray lacquers have had an important place in the great movement toward rapid production. An automobile body finished with lacquer in about two days is as good and possibly better than one coated with the old type of coach finishes made of varnishes and enamels used about half a generation ago. A serviceable repair on a fender or other small refinishing job is now done with lacquer in one day. With enamels and varnish air-dried finishes, the time required was at least two weeks. Baking helped to speed up enamel finishes, however, and increased the durability before the days of lacquer.


INDIAN "BONE" BREASTPLATE
PLATE BY W. BEN. HUNT, HALES CORNERS, WIS.
Buckskin thong
The long "bone" beads used for these breast plates were called hair pipes by the Indians, and were used as a medium of exchange in trading. The finer they were the more valuable they were.
To fasten at neck A to A should reach to collar bone.
Beads are strung straight across but they usually hang as shown.
Beads used here were large blue ones and small white ones.
The hair pipes can be made of wood or paper, wood being easier to get in camp, while paper is easier to get in the school or workshop, or when ash, which is best adapted for this project, cannot be obtained.
1 TO MAKE THEM OF WOOD cut a bundle of green ash shoots (not branches) 3/8" thick
2 Cut out the sections between buds or branches. Fig. 1. Indians made hair pipes from 3 to 5½ inches long.
3 Poke out pithy core with a stiff wire as shown in Fig. 2.
4 Now sharpen your knife to a good keen edge and whittle first one half to shape and then the other, Fig. 3. to about ¼ inch in the middle and tapering down to about 5/32 inch at the ends. This calls for some very careful whittling and a very sharp pocket knife.
There are 94 "bones" in the breastplate shown here. The bone section measures 12 inches from top to bottom.
Ties to go around the waist.
Buckskin thong
File the end of the wire straight across so that the core is pushed out ahead of it.
Fig. 2

Lacquer is widely used. A list of some of the many uses for lacquer that are now known may be of interest. Such a list would include: Automobiles, airplanes, steel-metal work, toys, dolls, lead pencils, handles, and coatings for such metals as nickel, silver, aluminum, white-metal compositions, and often for brass, particularly light fixtures and spun work. Lacquer is also commonly used on builder's hardware especially on door hinges, knobs, escutcheon plates, fireplace fittings, and various plumbing fixtures. To this list also may be added all instruments employed in navigation, hardware and metal parts used about the seacoast, also scientific instruments such as microscopes, surveyor's transits, telescopes, and a host of articles in the novelty field that are used in everyday life and need a protective coating either in a transparent or opaque form.

Spray-gun technique easily acquired. Spray-gun technique is easily acquired. It requires only a short time for satisfactory service and skill soon follows. It is known, however, that skill with a brush in applying finishes requires time, training, and experience. Lacquer application with a brush is a rather difficult operation at best, even for a skilled workman,

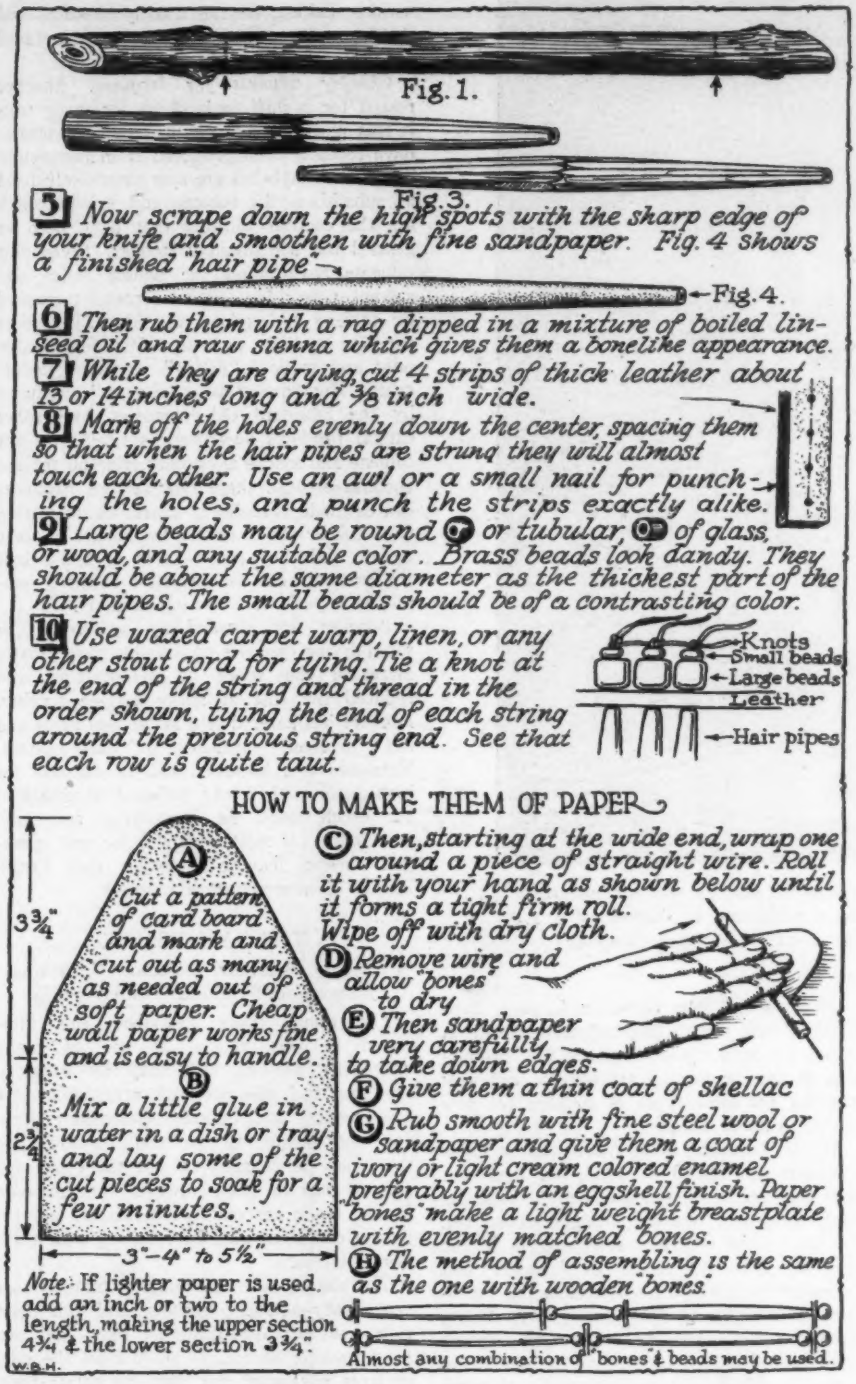


Fig. 1.
Fig. 3.
5 Now scrape down the high spots with the sharp edge of your knife and smoothen with fine sandpaper. Fig. 4 shows a finished "hair pipe"
Fig. 4.
6 Then rub them with a rag dipped in a mixture of boiled linseed oil and raw sienna which gives them a bonelike appearance.
7 While they are drying, cut 4 strips of thick leather about 13 or 14 inches long and 3/8 inch wide.
8 Mark off the holes evenly down the center, spacing them so that when the hair pipes are strung they will almost touch each other. Use an awl or a small nail for punching the holes, and punch the strips exactly alike.
9 Large beads may be round or tubular of glass, or wood, and any suitable color. Brass beads look dandy. They should be about the same diameter as the thickest part of the hair pipes. The small beads should be of a contrasting color.
10 Use waxed carpet warp, linen, or any other stout cord for tying. Tie a knot at the end of the string and thread in the order shown, tying the end of each string around the previous string end. See that each row is quite taut.
Knots
Small beads
Large beads
Leather
Hair pipes
HOW TO MAKE THEM OF PAPER
A Cut a pattern of card board and mark and cut out as many as needed out of soft paper. Cheap wall paper works fine and is easy to handle.
B Mix a little glue in water in a dish or tray and lay some of the cut pieces to soak for a few minutes.
3 3/4"
2 3/4"
3"-4" to 5 1/2"
Note: If lighter paper is used, add an inch or two to the length, making the upper section 4 3/4" & the lower section 3 3/4".
W.B.H.
C Then, starting at the wide end, wrap one around a piece of straight wire. Roll it with your hand as shown below until it forms a tight firm roll. Wipe off with dry cloth.
D Remove wire and allow "bones" to dry
E Then sandpaper very carefully to take down edges.
F Give them a thin coat of shellac
G Rub smooth with fine steel wool or sandpaper and give them a coat of ivory or light cream colored enamel preferably with an eggshell finish. Paper "bones" make a light weight breastplate with evenly matched "bones."
H The method of assembling is the same as the one with wooden "bones."
Almost any combination of "bones" & beads may be used.

and it is still more difficult for a beginner. A homeworker, or a student at school, can soon acquire the experience needed for application of lacquer with a spray gun. Reduction in the time needed for training of an operator of a spray-gun is only part of the story. The most important gain is that the spray-gun operator can do many times as much work in a day, or he can cover so many more square feet of surface that there is no comparison with brush work at all.

Cheap sprayers aid shift to lacquer. An outfit for spraying finishes consisting of a spray gun, air compression or storage tank, a pump, and a motor has been rather expensive until recently. Now various companies offer cheap outfits for small-shop use or for the home workshop that cost only a few dollars as is shown on the advertising pages of various magazines at a cost of from $5 to $18.50. These various devices for spraying vary in efficiency according to the cost largely, and also as to their construction. The cheap models will not sustain a very high pressure continuously, but they are usually satisfactory for small jobs. Satisfaction with a spraying outfit is apt to depend on the amount of air pressure it will produce and sustain, and on the spray gun with its two or more nozzles which vary somewhat in size.

Homemade sprayers that are constructed from spare parts, such as a 1/8- or 1/4-h.p. electric motor, a pump (an air pump as shown in Mr. Pearson's outfit in Fig. 1), an air tank, and a spray gun with several lacquer containers, which may be 1-pint glass jars or cans such as are used for fruit. The outfit shown in Figure 1 was assembled by Mr. Pearson of Pasadena for use in a small shop for furniture finishing with lacquer and has been used for spraying hundreds of articles of furniture that came to him for refinishing. Although only about 30 lbs. of pressure can be maintained, his refinishing is satisfactory because he thins his lacquer enamel for the reduced air compression and also uses a nozzle adapted to low pressure and the thickness of the lacquer which he uses.

It should be remembered that lacquers vary in specific gravity and viscosity and that these variations affect the atomizing of the liquids.

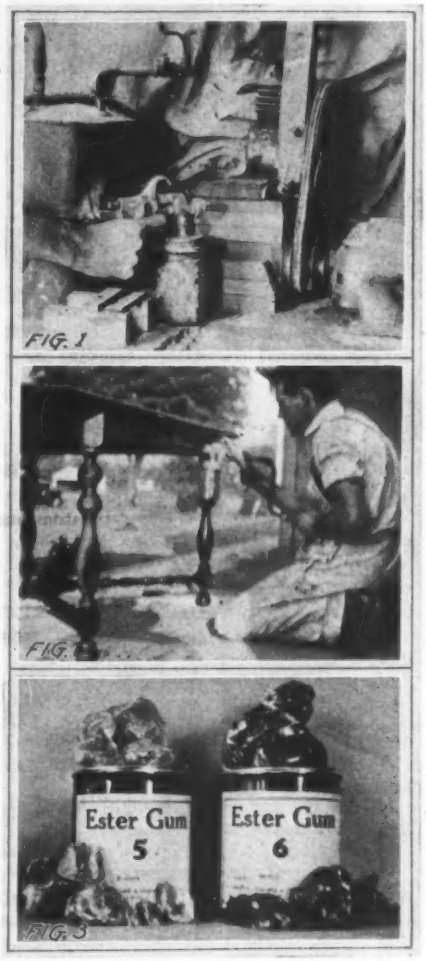
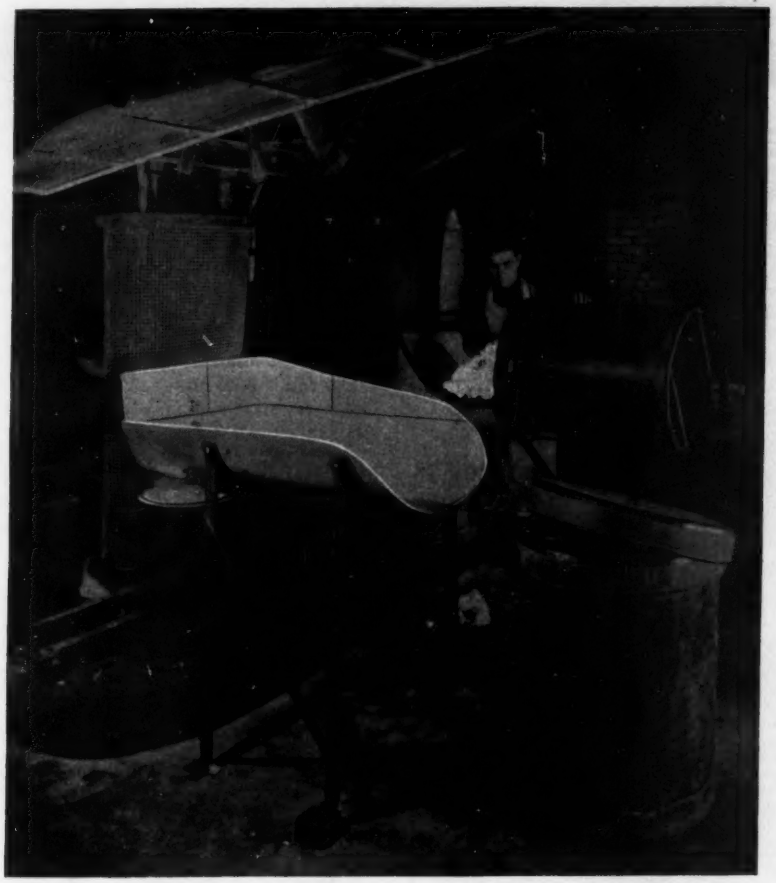


Fig. 1. A homemade spraying outfit for lacquer assembled by Mr. Curtis Pearson of Pasadena. Fig. 2. Applying spraying lacquer with this homemade outfit, using a pressure as low as 30 lb. Fig. 3. Pale and amber ester gum used in lacquer making. They are now being replaced by pure synthetic resins



The purified cotton is charged into mechanical dippers for the nitration process, one of the important steps in the manufacture of finishes by E. I. du Pont de Nemours & Co. Photo courtesy du Pont Company

For these reasons, it is absolutely necessary to regulate the air pressure for the material used and also to thin the lacquer if it has too high a viscosity for complete atomizing with the nozzle and spray gun that are employed. It is true that the type of spray gun and its nozzle affect the amount of air pressure absolutely necessary.

The following air pressures are found most satisfactory:

For primers or sealers when possible	55 to 90 lbs.
Lacquer enamels with high-pressure outfits	60 to 82 lbs.
Standard furniture lacquers without pigments	45 to 70 lbs.
Lacquers of low viscosity or thickness of fluid	30 to 45 lbs.
Very heavy bodied liquids which will spray	12 to 25 lbs.

Changes and improvements in lacquers. Almost revolutionary changes in lacquer composition have come about within the past five or six years. Until quite recent times, the resins placed in lacquers were dammar, especially at first, followed by quite general use of ester gum, which is a glyceryl ester of resin that has been known in our country since about 1893, but whose real value was not fully understood for about 25 years after that date. Now synthetic resins and new petroleum hydrogenated naphthas are found in many lacquer formulas.

Shift to synthetic resins in lacquer. Synthetic resins, which have rapidly grown in popularity with the development and production of new resins that are suitable and very superior for some types of lacquer, are now placed in many lacquers.

In Dr. Zimmer's book, *Nitrocellulose Ester Lacquers,* translated in 1934, we find that synthetic resins were appearing but that the ideal compound was still being searched for. In the United States, much progress in the use of synthetic resins in lacquers had appeared by 1932. In an article in the *Furniture Manufacturer Magazine* (May, 1932), Earl Dunbar states that the early lacquers contained dammar, kauri, shellac, and elemi, but that only a limited amount of such gums could be used, and that lacquers had little gloss and thickness of film. Mr. Dunbar then turned to a discussion of synthetic resins for lacquers and stated that lacquers were being made at that time having a higher solid content because of the use of synthetic resins.

Today there is much evidence that there has been a definite swing to the use of several types of synthetic resins or resinoids in lacquer manufacture. Evidently synthetic resins have won a place in lacquer formulas on their merits. It should be pointed out, however, that the synthetic resins used in lacquers, while similar to those used for varnish making, are not usually identical and that special products are now manufactured for use as lacquer resins.

Cheaper diluents for lacquers. Another reason for a shift to lacquers for many uses is that new and cheap hydrogenated naphthas have recently been produced from petroleum. These new naphthas are now extensively used as substitutes for toluene and xylene which are the coal-tar diluents that have been in general use for thinning lacquer. These new diluents have about the boiling range and solvent power for synthetic resins possessed by toluene and xylene and also have some superior qualities such as a less disagreeable odor and reduced "lifting" action on undercoats. The coming of "Solvesso," produced by the Standard Oil Company, and other similar products now used as substitutes for toluene and xylene is another triumph for the chemist because these new solvent naphthas can be made available in enormous quantities, their use is said to reduce the danger of toxic action, and they can be sold at about half the price of coal-tar products formerly employed as resin solvents and thinners.

Lacquer has speeded up industry. The rapid-drying qualities of lacquers have greatly increased the speed of manufacture and reduced the cost of many surface finishes. Lacquer has entered into many new fields and has displaced varnishes to some extent. Varnishes are, however, still in demand for high-grade rubbed and polished finishes and for brush work. As a material for rapid production for metalwork and for soft spray-gun finishes having a rather dull luster, lacquer is now almost supreme.

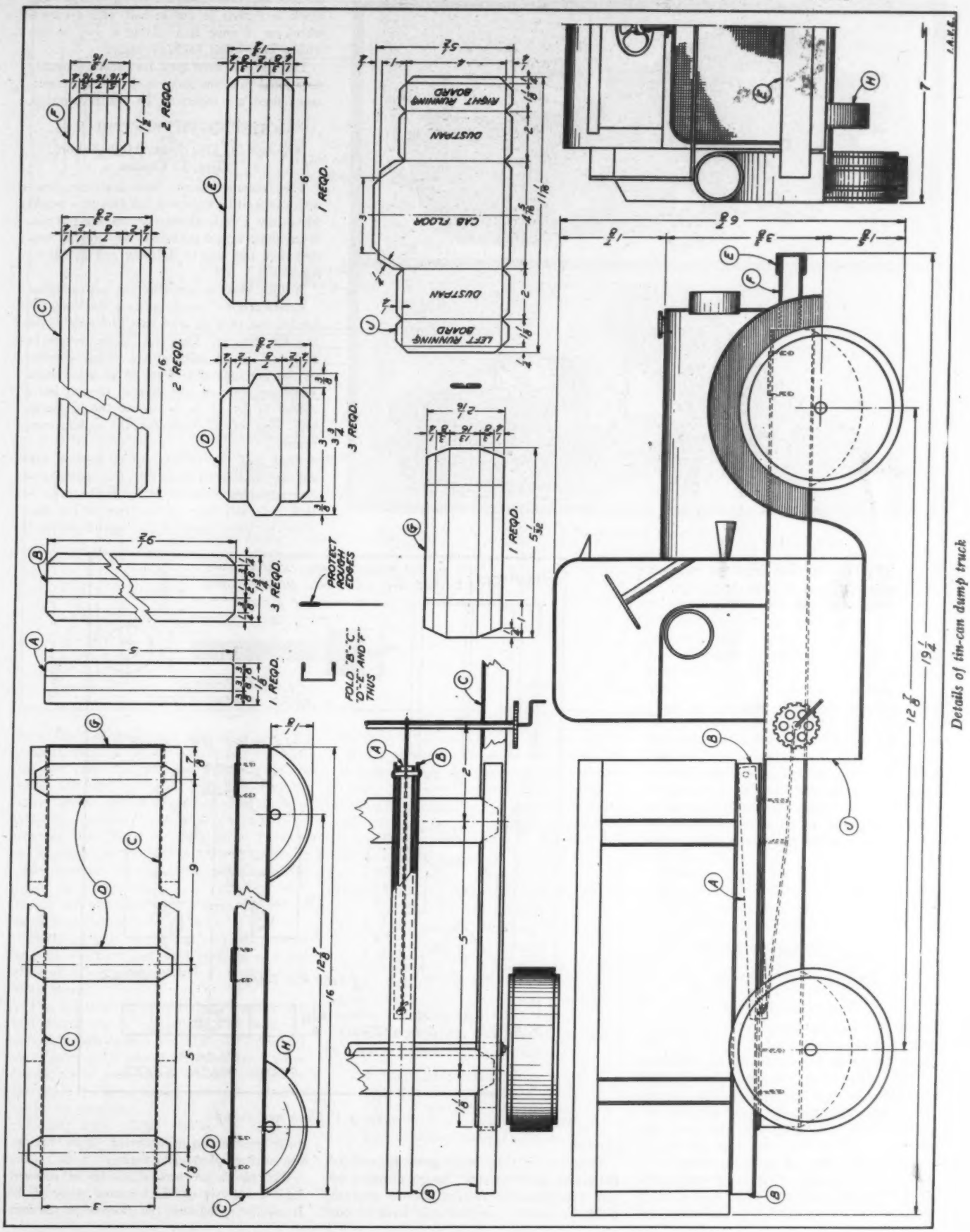
TIN-CAN TRUCK

Frank D. Rohmer, Director Vocational Education, Midland, Pennsylvania

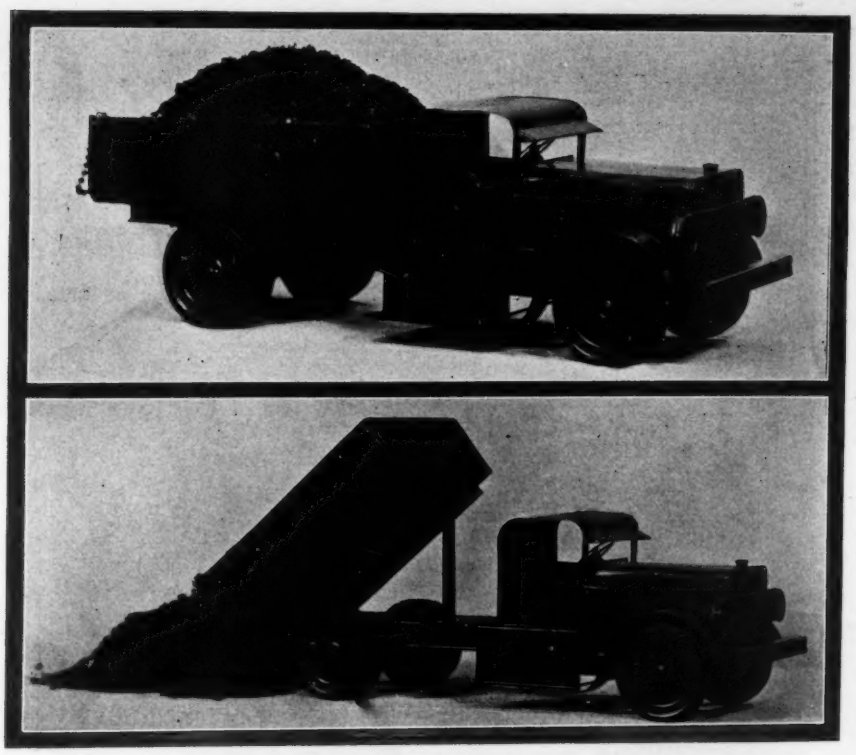
The dump truck described and illustrated in this article, is one of many interesting projects that may be made of tin cans and miscellaneous scrap materials. The general and detailed dimensions given are not meant to be too specific, and they may be changed to suit the types and sizes of cans on hand. However, the cans used in this truck are readily obtainable, and the dimensions given may be followed with gratifying success.

The chassis sections, bumper, bumper support, body-support channels, and cab floor, right- and left-hand dustpans, right- and left-hand running boards are made from the sides of large restaurant-size cans. To obtain these sides, cut the tops and bottoms off clean, and trim the resultant stock on the shear to eliminate all rough edges. A can 8 in. in diameter by 9 in. high will net a flat piece of tin 8 by 24 in.

The body is a standard 1-gal. varnish can. The cab may be fashioned from the flat stock, but in this case, we used a 1-qt. can in which "Pyrene" fire-extinguisher solution had been shipped. The hood is a large-size cocoa can. The fenders and springs were made of the usual vegetable cans. The wheels are evaporated-milk cans. Axles may be made of No. 8 iron wire running through ¼-in. copper



Details of tin-can dump truck



Tin-can dump truck

tubing. The latter act as bearings and are rigidly soldered to and through the springs.

The springs are made two each per can by cutting the sides down and then cutting the bottom off center as shown. They are butt soldered to the chassis. Evaporated-milk cans make neat wheels, since the tops and bottoms are lap soldered to the side. These ends are easily removed and resoldered to the sides after being properly trimmed to their correct width. The rear wheels are 1 in. wide and the front wheels are ½ in. wide. The tires are from a "Bissell" carpet sweeper and are readily obtainable from any furniture store. The horn is a cutdown spout section taken from a home-type oil can, while the headlights are the dual caps usually furnished on a can of that type.

No attempt is made to detail other parts of the truck since these vary, depending upon availability of material and desires of the individual craftsman.

V BLOCK AND CLAMP

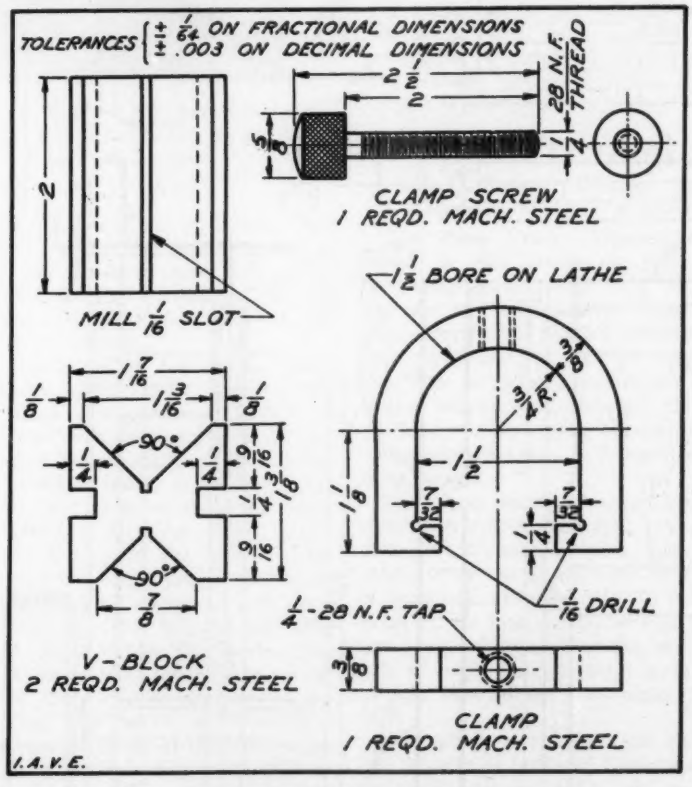
Edwin M. Moe and W. H. Bugg,
Morton Senior High School,
Richmond, Indiana

The V block illustrated herewith is made from a piece of 1½ by 1½ by 4¼-in. mild steel. The sides and ends may be milled or shaped to size. The slots are milled and the V's shaped or milled as desired. The V's may be of any size desired, but a considerable difference should be evident in the two sides so they cannot be confused when finished.

The block is then cut partially through with a ⅛-in. slitting saw. Cuts are taken ½ in. deep which will leave a 7/16-in. square, holding the blocks together for hardening and grinding.

The block is then rough ground, casehardened, and finish ground. Rough grinding before casehardening enables one to give the block a .010-in. case and still have a .007- or .008-in. case after finish grinding. The block may then be cut in half with a cut-off wheel, or if none is available it can be cut with a high-speed hacksaw blade.

This job has been used for second-semester vocational machine-shop students. The tolerances used are indicated on the illustration.



Details of V block and clamp

MODERNISTIC FOOTSTOOL

George N. Duerksen, High School,
Girard, Kansas

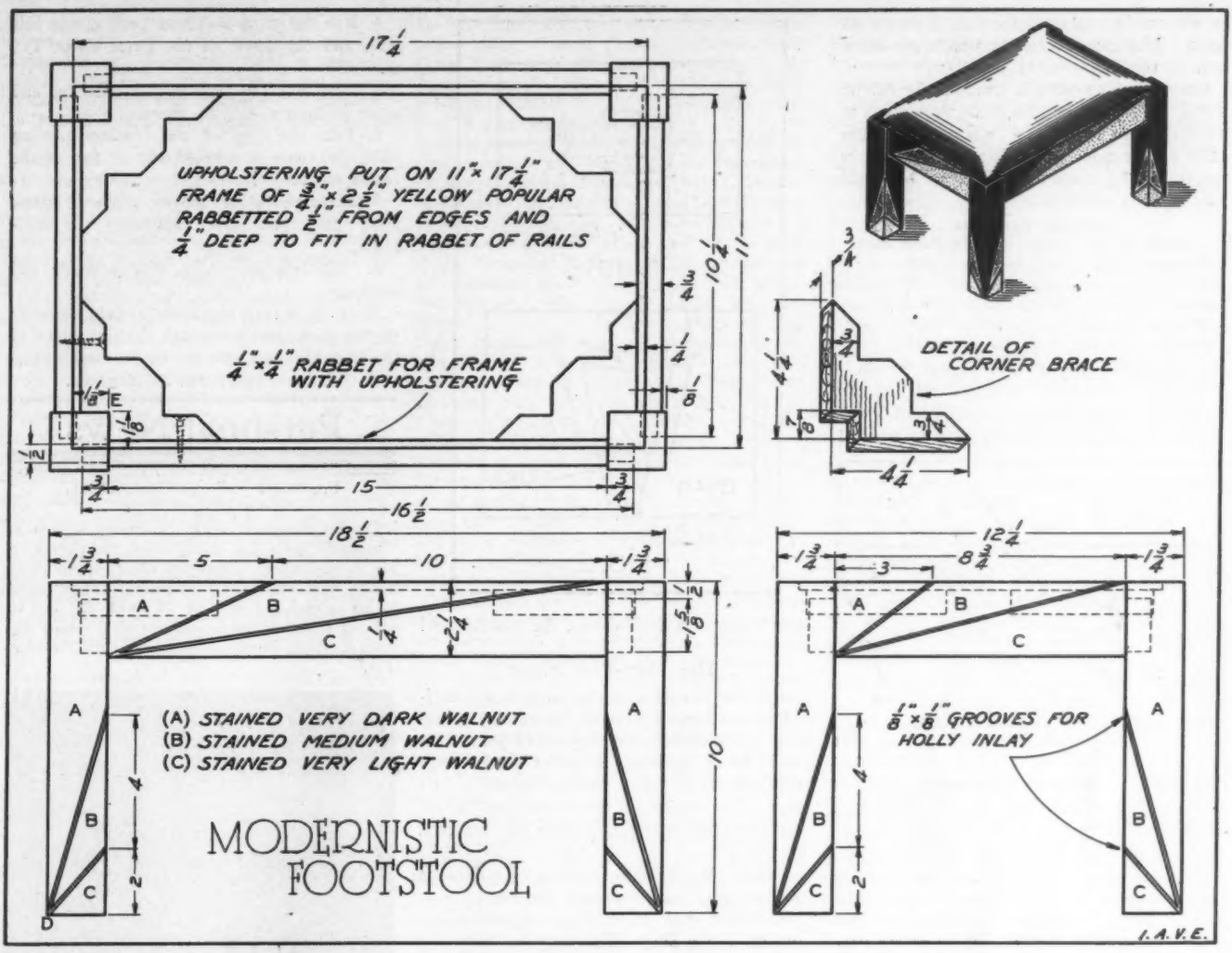
The footstool shown and described herewith can well be a project for first-year pupils who show a little above the average interest. It involves varied problems, not only in construction, but also in finishing and upholstering.

Walnut wood is probably the best adapted.

Construction: Dress up two side rails ¾ by 2¼ by 16½ in. and two end rails ¾ by 2¼ by 10¼ in. Then cut ¾-in. tenons on each end of all rails with a ½-in. shoulder on the top edge and ⅛ in. on all other sides. These are cut out and dressed to size and a rabbet ¼ by ¼ in. is cut on the upper inside edge of all rails for the upholstering frame.

Four legs 1¾ by 1¾ by 10 in., are next cut and dressed to exact size. Cut mortises on two adjoining faces of each for the rails, so that rails will lack ⅛ in. from fitting flush with the outer faces of the legs. A recess is made on the top of each leg ¼ by 1⅛ by 1⅛ in. for upholstering frame.

The pieces are now ready to be grooved for the holly inlay which comes ⅛ by ⅛ in. It will be noted that the grooves on the legs


UPHOLSTERING PUT ON 11" × 17 1/4" FRAME OF 3/4" × 2 1/2" YELLOW POPULAR RABBETTED 1/2" FROM EDGES AND 1/4" DEEP TO FIT IN RABBET OF RAILS
1/4" × 1/4" RABBET FOR FRAME WITH UPHOLSTERING
DETAIL OF CORNER BRACE
(A) STAINED VERY DARK WALNUT
(B) STAINED MEDIUM WALNUT
(C) STAINED VERY LIGHT WALNUT
1/8" × 1/8" GROOVES FOR HOLLY INLAY
MODERNISTIC FOOTSTOOL
I. A. V. E.

have their origin on the bottom of opposite corners, namely, the outside D and inside E. On the rails, the grooves commence at the lower left and corner of each rail, and the lower one on each rail running exactly diagonally on the rails. These are cut with a ⅛-in. circular saw. With the help of a T bevel, scrap pieces are laid out and cut as guides to slide along a regular guide parallel to the blade to produce the slant cut. Four such blocks are necessary. The grooves should be as deep as the thickness of inlay.

Holly inlay is next glued into the grooves and allowed to extend well over the end and sides of legs and rolls. After all is dry, dress inlay down.

The footstool is then ready for assembling and gluing. After excess glue has been removed, design braces for each interior corner and fasten with two flathead screws. These braces are a great asset for the solidity of the project. Fasten braces and the project is ready for sanding.

Finish: First of all, shellac the inlay so that the stain will not discolor the holly. Two shades of stain are necessary and the third may be the natural color of the wood. It will be necessary to make the darkest a very dark walnut, in fact, nearly black. After stains A and B have been applied and allowed to dry, a coat of hot linseed oil over all brings out the colors nicely and also the natural grain in the C sections. Proceed with varnish-rub finish. The covering of the upholstered frame may be a solid color or better if it is possible to get a piece modernistic in design it will add to the oddity.

RELATED MATERIAL FOR THE PATTERNMAKER

C. W. Illingworth, Racine, Wisconsin

Measuring Lumber

Lumber is sold both rough and dressed. Rough lumber has not been planed. It is usually the thickness called for, although it sometimes varies 1/32 in. more or less.

Dressed lumber has been planed and is not as thick as called for, as for instance:

1 -in. lumber comes	$\frac{25}{32}$ in. thick
1¼-in. lumber comes	$1\frac{3}{32}$ in. thick
1½-in. lumber comes	$1\frac{11}{32}$ in. thick
1¾-in. lumber comes	1½ in. thick
2 -in. lumber comes	1¾ in. thick

The foregoing table is from a set of standards used by the National Hardwood Lumber Association. This association has agreed that its members (lumbermen) shall furnish dressed or surfaced lumber in those sizes.

A foot of lumber is 1 by 12 by 12 in., or a piece of equal volume. In calculating the number of board feet in a given piece of lumber, multiply the length in *feet* by the width in *feet*, and then by the width in *inches*. Thus, in a piece of 1¼ by 8-in. lumber 10 ft. long, there will be $10 \times 2/3 \times 1\frac{1}{4} = 8\ 1/3$ board feet.

Estimating Weights of Castings

The patternmaker is frequently called upon to estimate with more or less accuracy the weight of castings from the pattern or even from the drawing.

A rough approximation may be arrived at quickly by weighing the pattern and multiplying the number of pounds by 16. This is for pine patterns which are to make gray iron castings. This method is not very accurate as it does not allow for the nails, screws, and core prints in and on the pattern. When there are core prints on the pattern it is best not to use this method.

The best practical method, and the one which may be used even before the pattern is made, is to find the contents of the casting in cubic inches. (*Example:* A 2 by 4 by 8-in.

pattern would contain 2 by 4 by 8 in. = 64 cu. in.) Multiply this by the weight per cubic inch of the metal to be used.

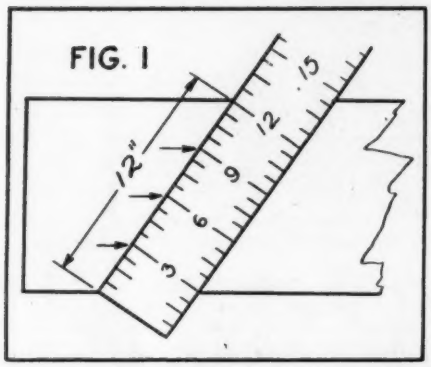
Example: The pattern contains 64 cu. in. and is to be cast of aluminum. According to the table of constants, aluminum weighs .0924 lb. per cubic inch. Therefore, to get the weight of the casting multiply 64 by .0924 which equals 5.9136 lb.

Table of Constants

Metal	*Weight Cubic Inch*
Aluminum	.0924
Brass	.3
Iron	.26
Steel	.2816
Copper	.3814

Dividing a Board Into Equal Strips

Figure 1 illustrates a quick method for dividing a board into any number of strips of equal width. Say a board 10½ in. wide is



to be cut into four strips. Lay a rule across diagonally so that it measures any number that can be divided by 4, as for instance, 12. Now mark off on this angle four points or in this case, every 3 in. Draw lines through these points and parallel with the edge. You will find them equally spaced.

Chaplets

Where it is not possible properly to support a core with core prints, chaplets are used. Often a core will fall or overbalance if there is no support. Again, a core may rise or float up because it is not properly held down. Chaplets placed in the mold and on the core will prevent this.

Chaplets are made of thin white metal which melts easily. Some look like spools, others are perforated pieces of metal bent into a hollow square. They come in different sizes to match different thicknesses of metal.

In placing chaplets in a mold, where an overbalanced core is used, the pattern is drawn out, a chaplet placed in the drag, the core set in place resting on the chaplet, and then another chaplet placed on top of the core. The core is then closed over and it will touch the upper chaplet. See Figure 1. The chaplets should be of the same size as the final metal thickness.

Another type of job is shown in Figure 2. Here chaplets are in the cope only and serve to hold the core down so it will not float up.

When the hot metal runs in, it gradually softens the chaplet which then becomes fused with the iron.

The objection to the chaplets is that they do not always fuse in properly and may cause a

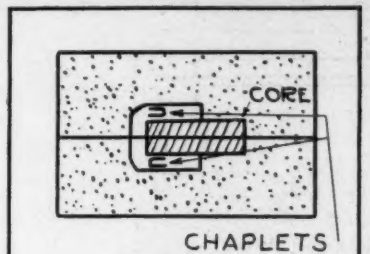


FIG. 1

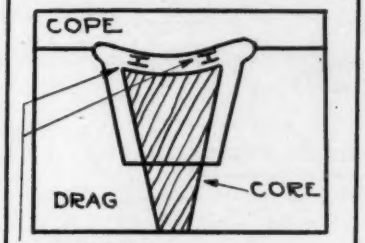


FIG. 2

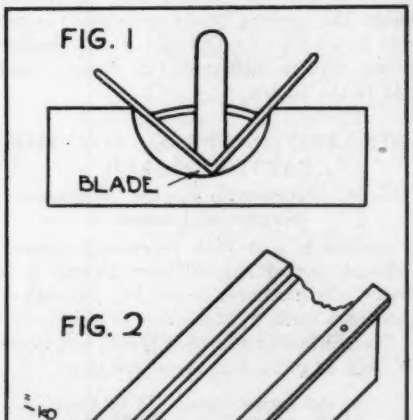
leak where it is desired that the casting hold water.

The Core-Box Plane

The core-box plane is used to plane out half-round core boxes 1½ in. in diameter or larger. It is not practical for very small jobs. This plane, being right-angled, works on the same principle as a square moving inside a half circle. The corner of the blade cuts as the plane revolves around the circle. See Figure 1.

To Use

1. Lay out the half-core box with lines on the face and half circles on the ends.
2. Gouge out roughly to within about 1/8 in. of the lines. (This may be done on a circular saw if one is available.)
3. Tack a thin straight piece of wood even with a line on the face. This is a guide to start the plane. See Figure 2.



4. Run the plane back and forth against this strip and cut down on the circle about 1/8 in.
5. Now tack the strip to the other line and plane as before, 1/8 in. down.
6. Take the strip off and continue planing until the circle is worked out as far as the center of the bottom.
7. Plane the other quarter circle of stock away until you have completed the half-round.
8. Trim off any burrs with a gouge and sandpaper.

Note: It is very important to hold the sides of the plane firmly against the top edges of the box. However, do not use so much pressure that the corners will be damaged.

Personal News

FATHER OF VOCATIONAL EDUCATION DIES

Charles Ricketson Allen, commonly known as "Skipper" Allen, has relinquished the rudder of his yacht and of vocational education to other hands. The well-known educational leader went to his eternal rest on July 15, 1938. He died of a heart attack which he suffered on a return trip from Daytona Beach, at his home in San Antonio, Tex.

Dr. Charles R. Allen

Dr. Allen was born in New Bedford, Mass., August 6, 1862. He received his early education in the Friends Academy and the high school of his native city. He attended the Massachusetts Institute of Technology, specializing in chemistry. This institution conferred the B.S. degree upon him in 1885. He did graduate work at Johns Hopkins University in 1893 and received the M.A. degree from Harvard in 1903. In 1927, Stout Institute, Menomonie, Wis., conferred an honorary D.Sc. degree on him.

From 1886 to 1902, he taught at the New Bedford High School. In 1906 he was given charge of the development of vocational education in that city and he continued in this position until 1911. From 1909 until 1911 he also was director of the New Bedford Independent Industrial School. In 1911 he was appointed agent for industrial training for the Massachusetts Board of Education. He held this position until 1917 when

(Continued on page 15A)

(Continued from page 314)

he was appointed member of the Emergency Fleet Corporation. In November, 1918, he was appointed to the staff of the Federal Board for Vocational Education and became special agent for the Federal Board for Vocational Education in 1921.

From 1922 to 1924, he was director of industrial training service at the Dunwoody Institute, Minneapolis, Minn. In 1924, he returned to Washington, D. C., to serve as editor and consultant of the Federal Board for Vocational Education. This position he held until his retirement from government service in December, 1934.

Dr. Allen was also well known for his many contributions to the literature in the field of vocational education. Among the books which he wrote as sole author or as collaborator are: *Laboratory Manual of Experimental Physics; The Instructor, The Man, and The Job; Vocational Education in a Democracy* (with C. A. Prosser); *Have We Kept the Faith?; Supervision of Vocation Education* (with J. C. Wright); *Efficiency in Vocational Education; Efficiency in Education*, and *The Administration of Vocational Education*. During the last year of his life, he worked on the following four books: *Safety on the Highway* (with C. A. Prosser); *The Individualized Program for Instruction in Diversified and Distributed Education* (with E. L. Williams); *Program for a Non-Academic Group* (with Charles Cox), and *Guards* (with his wife, Arda Talbot Allen).

Besides doing all of this literary work, Dr. Allen was active on the faculty of St. Mary's University at San Antonio, Tex., during the past few years.

Dr. Allen will be mourned by many. There are few educational leaders who have made such a profound impression on men of importance in industry, in the army and navy, in governmental circles, and in the various fields of education. Vocational education has lost one of its most distinguished lights, and INDUSTRIAL ARTS AND VOCATIONAL EDUCATION regrets the necessity for publishing the news of the death of one who has done so much for the field of education for which it stands.

Association News

A four-state regional conference on problems of the industrial-arts teacher and supervisor will be held at Kansas State Teachers College, Pittsburg, Kans., on Friday and Saturday, October 7–8, 1938.

Mimeographed outlines of the subject matter admitted for discussion will be prepared for distribution to all persons who attend the conference. For this reason, all who expect to attend are asked to send their reservations promptly to Dr. William T. Bawden, chairman of the executive committee. To permit preparation of the mimeographed outlines, these reservations will close at 5 p.m., Tuesday, September 20.

The first meeting will start promptly at 10 a.m. Friday, October 7. The subject for discussion will be "Administrative Problems of the Supervisor." The chairman of the meeting will be R. B. McHenry, Director Industrial Education, City Schools, Fort Smith, Ark. Other speakers on the program will be O. L. Barnett, Kirksville, Mo.; W. J. Breit, Little Rock, Ark.; Walter L. Friley, Independence, Kans.; C. E. Paul, Muskogee, Okla.; C. J. Richardson, Chickasha, Okla.

The second meeting will be called at 2 p.m. The subject for discussion will be the "Techniques of Shop Organization and Class Management." The chairman at this meeting will be De Witt Hunt, Head, Department Industrial Education, State A & M College, Stillwater, Okla. Other speakers on the program will be E. W. Bass, Russellville, Ark.; Noel B. Grinstead, Warrensburg, Mo.; C. L. Hill, Tulsa, Okla.; Truman R. Lee, Salina, Kans.

At the 6 o'clock Friday evening dinner, reservation for which will close at 5 p.m., Wednesday, October 5, the toastmaster will be Dr. William A. Brandenburg, President, Kansas State Teachers College, Pittsburg, Kans. "Industrial Arts for the Superintendent and Principal" will be the topic of the discussion. Speakers on the program will be: Chairman, C. B. Gatchell, Director, Industrial Education, City Schools, Joplin, Mo.; LeMoyne B. Carlyon, Neodesha, Kans.; C. M. Fisher, Fayetteville, Ark.; G. M. Morris, Boonville, Mo.; C. A. Pickel, Ponca City, Okla.

Saturday sessions will begin at 9 a.m. The discussion will center on the "Philosophy of Education as Applied to Industrial Arts." The chairman will be R. L. Schwanzle, Associate Professor of Industrial Education, Kansas State Teachers College, Pittsburg, Kans. Other speakers on the program will be M. E. Franklin, Tahlequah, Okla.; Winfield W. Scott, Topeka, Kans.; Robert W. Selvidge, Columbia, Mo.; H. T. Ziegler, Little Rock, Ark.

The business session will be held at 11 a.m.

The subject for discussion at the luncheon meeting at 12:15 p.m., reservations for which will close at 3 p.m., Wednesday, October 5, will be "The Improvement of Teachers in Service." The chairman for this meeting is Verne L. Pickens, Supervisor Industrial Arts, City Schools, Kansas City, Mo. Other speakers on the program will be Omar H. Day, Kansas City, Mo.; L. E. Falgren, Kansas City, Kans.; E. E. Hartnett, North Little Rock, Ark.; Ralph K. Nair, Pawhuska, Okla.

Adjournment will follow at 2.30 p.m.

An Epsilon Pi Tau chapter was installed at State Teachers College at San Jose, Calif., on May 28, and one at the State Teachers College, Flagstaff, Ariz., on June 4. This means that this honorary fraternity now has 18 chapters and 1,300 members.

Dr. Frank Cody, superintendent of schools, Dr. Warren E. Bow, assistant superintendent, and Robert L. Anderson in charge of safety education, assumed active parts in the recent three-day Michigan state-wide Safety Conference held in Detroit, May 23–25.

The conference studied the following topics: What is the Place of the School in the Safety Movement?, What Has Been Done in the Schools Thus Far?, and What Are the Next Steps for a Well-Balanced Safety Program?

More than 200 boys registered at the First National Convention of the Future Craftsmen of America held at the Detroit Leland Hotel, May 5–7. The Michigan Chapter acted as host to the delegates of ten states represented at the convention. Conferences, committee meetings, luncheons, business meetings, and dinner programs were boy meetings, for and by the boys. The Friday evening dinner session was specially inspiring to see. Twelve boys seated at the speaker's table with Wm. B. Stout, president of the Stout Engineering Laboratories, the only adult to speak, was an impressive picture of boy activity. Robert Stimac, boy president of the organization, acted as toastmaster. Public-speaking contests were the order of the evening.

Frank Leach, was elected president of the Future Craftsmen of America to head the 200 or more chapters over the country.

The Wisconsin Vocational Association held its third annual convention, May 6 and 7, in Wausau. Approximately 1,200 persons were in attendance. The association changed its name to the Wisconsin Association for Vocational and Adult Education so that it would better conform to the increasing emphasis the vocational schools of Wisconsin are placing on adult education.

The convention was dedicated to the work and memory of the late Dr. McCarthy, who initiated and developed the part-time system of vocational education in Wisconsin. Mr. George P. Hambrecht, the director, delivered an address in commemoration of the life and work of Dr. McCarthy.

A new keynote was sounded for vocational education when Governor La Follette issued a proclamation designating the week of May 2 to 7 as "Wisconsin Vocational and Adult Education Week." The convention was a culmination of activities carried on throughout the state to focus the attention of the public upon the work carried on in the Wisconsin schools of vocational and adult education.

C. W. Illingworth of Racine was elected president. W. A. Brazier was retained as secretary-treasurer. Two new members were added to the executive board: C. A. Wickman, Superior, representing trade and industry; J. F. Jones, Waukesha, representing agriculture. J. A. Kubiak was retained as vice-president, representing rehabilitation. Appearing on the program were the following guest speakers:

Dr. John Rockwell, Commissioner of Education for the State of Minnesota, who spoke on the subjects "The Place of Vocational Education in Socialized Educational Planning" and on "The Value of Adult Education for Long-Time Planning in a Democracy." Mr. C. William Duncan, columnist of the *Philadelphia Public Ledger*, who spoke on "Close-ups of Famous People" and on "Men and Women Who Make the Headlines." Dr. William H. Johnson, Superintendent of the Chicago schools, who spoke at the banquet on the subject "Theory and Practice in Vocational Education" and again at a joint luncheon of co-ordination and trade and industry on "The Importance of Trade and Industry Courses for Young Men." Thomas Quigley, President of the American Vocational Association, who spoke on the subjects "Professionalism" and "Adult Vocational Education." Dr. A. M. Field of the University of Minnesota discussed the integrated course method of teaching agriculture. Henry Ohl, President of the Wisconsin Federation of Labor, and J. M. Conway, President of Hoberg Paper Mills, speaking on the importance of labor and industry, respectively, in vocational education, and Professor H. Edgerton, University of Wisconsin, on the subject "Need for Vocational Guidance."

Several new sections were established, as follows: Music, Physical and Biological Sciences, Office Secretaries, and Attendance Officers. Thirty-five commercial exhibitors displayed their wares. The Association, by resolution, went on record as favoring:

1. Increased state aid for schools of vocational and adult education.
2. The organization of county boards for vocational and adult education.
3. A study of the requirement of teacher-training institutions and colleges toward improving the opportunities for professional improvement of teachers.
4. The establishment of a state supervisor of commercial education.
5. An investigation of the dismissal of any teacher under the tenure law.
6. Tenure for circuit teachers.

A resolution was passed opposing the Harrison-Fletcher Bill or any amendment to such a bill which mentions vocational education or which would deprive the states of administrative control of vocational and adult education.

(Continued on page 18A)

Every Man is the P

ENVIRONMENT

Product of his

A man's mind is like a moving picture camera. It takes pictures of what he touches, what he hears, what he sees—and stores them away inside. When he *thinks*, he thinks with those pictures. The point is, he can think *only what is in the pictures*—nothing more. That is why a man who lives in inferior surroundings and who is content to deal with inferior things, usually ends up in an inferior job. His thinking is inferior and the world has little use for it.

Every intelligent man knows how true this is, and he seeks every opportunity to *better* his surroundings . . . because of the stimulus to his ambition, the improvement in his thinking.

The intelligent student of mechanical drafting will take this lesson to heart. Habits are set early in life, and the habit of seeking a *better* environment is just as hard to break as the habit of being satisfied in a rut. He is careful to surround himself with the finest examples of work he can find. He studies the achievements of the leaders in his field. And most important of all, he selects his drawing set with the utmost care.

Choosing his drawing set for its accuracy, its precision, its quality, is the first step toward that "divine discontent" that leads upward. Beautifully made, beautifully balanced instruments school their owner's hands to the touch of fine things, strengthen his knowledge of the difference between the good and the shoddy, foster the habit of finished workmanship. They give him the confidence, the pride in his work so essential to accomplishment. There is a very real "magic" in a fine possession—particularly one that is used day in and day out. Drawing instruments are used through school, through college, even through the student's professional career. How essential it is then that they be selected with the utmost care.

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Dietzgen Drawing Instruments are manufactured in a wide array of styles, grades and assortments to meet the purse and service needs of everyone from the beginner to the professional draftsman and scientist. Regardless of price the name Dietzgen always identifies a greater value.

(Continued from page 15A)

¶ "The Implications of Guidance in a Progressive Program of Education" was the theme of the eleventh annual convention of the Michigan Industrial Education Society held in Detroit at the Book-Cadillac Hotel, April 28–30. The keynote which was struck at the first general session of the conference Friday afternoon and which re-echoed throughout the convention was understanding — understanding of one another, of the problems in an industrial democracy and, most of all, understanding of the youth who must learn to live in a democracy. As Dr. Edwin A. Lee, Director of the National Occupational Conference, New York City, said in summarizing the opening meeting Friday afternoon, April 29, after the consideration of the topic "Closer Co-ordination Between Industrial Arts and Trade Education": ". . . If each knows what the other is about, and keeps youth in mind, we can co-ordinate." The participants on this program or symposium were: Dr. Verne C. Fryklund, Head of the Department of Industrial Education, Wayne University, Detroit; Mr. Frank C. Moore, Director of Industrial Education, Cleveland, Ohio; Mr. George Fern, State Director of Vocational Education, Lansing, Mich.; Dr. Lawrence F. Ashley, Dean of Industrial Arts Department, Eastern Illinois Teachers College, Charleston, Ill.; Dr. Louis Newkirk, Director of Industrial Arts and Elementary Science, Chicago, Ill.; Mrs. Anna L. Burdick, Agent, Industrial Education for Girls and Women, Washington, D. C.

Outstanding in every respect were all details of the other sessions of the three impressive days of the most outstanding convention of the Society. Dr. Bess Goodykoontz, Assistant Commissioner of Education, Office of Education, Washington, D. C., inspired an audience of 406 delegates and their wives when she spoke at the annual dinner and dance Friday evening. Dr. Frank Cody, Superintendent of the Public Schools of Detroit, presided as toastmaster.

Dr. Edwin A. Lee spoke on the topic "Youth and the Days Ahead" Saturday noon at the luncheon meeting at which the members of the Guidance Association of Detroit and vicinity were also present.

Dr. L. H. Dennis, Executive Secretary of the American Vocational Association, spoke at the dinner for administrators Thursday evening. He noted the significance of fellowship in associations devoted to a common purpose and reviewed the increasing strength of vocational education in the program of education for the youth of this country.

Not the least of the "high spots" of the conference were the section meetings which considered the following topics and from which meaningful help was derived: Aeronautics, Auto Mechanics, and Machine Shop, Speaker — Jack Gordon, Representative from the Taylor Winfield Corporation; Apprentice Training, Al Goodwin, Murray Body Corporation; Drawing, Fred C. Bartels, Teacher of Drafting, Pershing High School, Detroit: Distributive Education, Round-Table Discussion on "Trends in Distributive Education," Jack Milligan, Assistant Supervisor of Distributive Education, State Vocational Board, Lansing, Chairman; Electrical, Mr. G. M. Chute, General Electric Company, and O. C. Rutemiller, Westinghouse Electrical and Manufacturing Company; General Shop and Woodwork, C. F. Harris, Assistant Manager Industrial Sales Division, Berry Brothers Paint and Varnish Company, Detroit; Air Conditioning, J. H. Nymberg, Air Conditioning Manager of Gar Wood Industries, Inc.; Printing, Ernst Baumann, Howard Flint Ink Co., Detroit; Dan Jacobs, Seaman-Patrick Paper Company, Detroit; Arthur Fox, Everton Engraving Company, Detroit; Major Sidney Raynor, American Typefounders Corporation, Detroit; Guidance and Co-ordination, Discussion Subject — "Placement Service of the Public-School System," George E. Myers, Professor Vocational Education, University of Michigan, acting as technical advisor; Women in Trade and Industry, Dr. Bess Goodykoontz, Assistant of the United States Commissioner of Education, Washington, D. C.

The Mu Sigma Pi Fraternity of Wayne University and the Stout Alumnae of Detroit entertained at breakfast, and numerous other intimate occasions gave opportunity for the exchange of professional opinions and the renewal of acquaintance.

Seven hundred sixty-one registered during the convention. The exhibits, both commercial and school, were a center of attraction throughout the convention. The commercial exhibitors had one of the finest and largest exhibits ever held at a Michigan Industrial Education Society convention.

The "Ships Program" Saturday was one of the high lights of the meeting. The interest in the prizes held the entire crowd until the last card was drawn.

The retiring officers are: President, Elmer C. Weaver, Kalamazoo; Arthur L. Reagh, Vice-President, Grand Rapids; Secretary-Treasurer, Thomas P. Garrity, Detroit.

The newly elected officers are: President, Arthur L. Reagh, Grand Rapids; Vice-President, Thomas P. Garrity, Detroit. The Secretary-Treasurer will be appointed by the Executive Committee.

News Notes

¶ The summer session at Stout Institute, Menomonie, Wis., again was very successful. Students from 31 states, two Canadian provinces, Porto Rico, and Hawaii were enrolled. Guest speakers during the summer were: Dr. James Shelby Thomas, Chrysler Institute of Engineering, who spoke on "What the Machine Has Done to Mankind"; West A. Burdick, Director of Highway Safety Department, Wisconsin State Highway Commission, Madison, held some conferences on safety education; William F. Patterson, Executive Secretary, Federal Committee on Apprentice Training, Washington, D. C., Conferences on Apprenticeship. Dr. Chase Woodhouse, "Women's Institute of Professional Relations, New Britain, Conn., spoke on "The Consumer in Our Modern Economy," and Barclay Achoson, Associate Editor, *Readers Digest*, "We Think. . . ." N. B. Giles, Special Agent, Federal Office of Education, Washington, D. C., held Conferences on Co-ordination; and Russell Wright, World Traveler, News Photographer, and Lecturer, gave an illustrated lecture "Germany Under Hitler." L. L. Shoemaker, Director Merchants' Service, National Cash Register Company, Dayton, Ohio, gave special conferences on the distributive occupations.

The enrollment analysis shows that there were 210 men and 133 women undergraduate students, 139 men and 35 women graduate students, a total of 517.

¶ The department of publishing and printing of the Rochester Athenaeum and Mechanics Institute, at Rochester, N. Y., will open its second year on September 6 with greatly increased facilities, both in floor space and machinery.

Over 50 per cent more floor space was added to take care of next year's increased enrollment, making a total of 7,750 square feet in the various rooms devoted to publishing and printing instruction. The equipment is now valued at $250,000, half of this being added for the coming year. The new equipment includes two new slug casting machines of the latest make, a total battery of 14 presses, type cabinets, and various other tools and materials.

Registrations are now being made by students from all parts of the country. The two-year full-time curriculum is designed to fit the needs of those who are interested in entering the publishing and printing field as a lifework. It is planned to train students for advancement on the basis of earned promotions. Courses are designed to give fundamental and liberal training which assure adequate opportunities for those who obtain experience in the field.

¶ The Derry Township Board of Education has announced that the coeducational Hershey Junior College, Hershey, Pa., will open this fall. Those who are eligible for entrance are the boys and girls who have graduated from the Hershey Public Schools and the orphan boys who have graduated from the Hershey Industrial School.

¶ A new machine shop will be installed in the Redford High School addition now under construction at Detroit, Mich.

¶ The sheet-metal trades are requesting the Detroit Board of Education to set up apprenticeship training in their field. John Gray, co-ordinator, Building Trades School, Detroit, Mich., is preparing the schedules.

¶ A reprint of "Vocational Training for the Distributive Occupations Under the George-Deen Act" by Frederick G. Nichols which appeared as an article in *The Journal of Business Education* is available from the National Council of Business Education, 512 Brooks Building, Wilkes-Barre, Pa. There is a small charge of 10 cents for single copies. The price per copy is reduced when reprints are bought in quantities.

¶ Pratt Institute, Brooklyn, N. Y., has announced the granting of a baccalaureate degree to future graduates of the course in teacher training. The student desiring to obtain the degree must pursue an integrated program offering a professional background, with a progressive point of view. Opportunities for supervised teaching have been greatly extended.

¶ On May 18, the Crowley-Milner Company sponsored a contest for gas-powered and International Wakefield airplane models. The meet was held at Ten Mile and Southfield Roads and was an N.A.A. sanctioned event.

¶ Construction work has been started on the Timken Vocational School, at Canton, Ohio, which is to provide a well-rounded program of education for boys and girls of the local community. Plans for the enlarged program of vocational education are being prepared by Mr. H. W. Benedict, of the McKinley High School, working under the direction of E. L. Heusch of the state department of education.

The building which will be five stories in height, is being erected and equipped by the Timken Foundation. When the building has been completed, it will be turned over to the board of education by the directors of the Foundation.

The first and second floors of the building will be devoted to shops and classrooms; the third floor will be given over largely to classrooms; the fourth floor will contain shops and classrooms; the auditorium in the center of the building will take in the first and second floors, while the gymnasium will be directly above the auditorium and will extend from the third floor to the roof. Well-equipped testing laboratories and reference libraries will be outstanding features of the new school.

¶ An apprentice plan, as part of the high-school instruction program, has been established in the public schools of Red Wing, Minn. The

(Continued on page 20A)

Are you teaching *Today's Method* of making prints to those who will be using them Tomorrow?

Read this letter!

. . . written by the drafting instructor of a large vocational school:

"Our savings over commercial blue printing paid for all Ozalid Equipment *the first year.*

"In my opinion, the Ozalid Process is well adapted to school use, particularly where it is made an *instructional device,* as it is here. All our drafting students are taught to operate the Ozalid machine, each boy having charge of the printing room in turn.

"This arrangement would be scarcely possible without the simplicity, speed and particularly the cleanliness of the Ozalid Process."

A few years ago the blue print process was the accepted method of making reproductions of engineering drawings. *Today* that method has been outmoded and is rapidly being replaced throughout industry by a simpler, more economical, more versatile method . . . the Ozalid White Print Process.

What are the advantages of the Ozalid Process tnat have caused this rapid and revolutionary change? In the first place, Ozalid Prints are *true* reproductions of the original drawing or tracing . . . *positive,* not negative. They are *white* prints . . . with blue, sepia, maroon or black lines on a *white* background . . . and they are *true-to-scale!*

Furthermore, the exclusive dry developing features of the Ozalid Process provides, for the first time, a simple and certain method of making *transparent duplicates* . . . on either cloth or paper . . . directly from the original drawing or tracing. Draftsmen can thus save hours of tedious retracing . . . by simply adding dimensions or other details or alterations to an Ozalid Transparent Duplicate of the original drawing, thus securing a new original, from which any number of prints can be made, without defacing the original drawing or retracing standard design.

These are only a few of the features that have prompted the rapid adoption of the Ozalid Process by industries of every type; and because of its increasing use, progressive schools are keeping their vocational departments *in step with the times* by installing Ozalid Equipment. They are instructing their students in the best and most modern print making method . . . *the method they will use in the future.*

The cost of Ozalid Equipment is low . . . so low that every school can now give students training in this advanced method of making prints. Clip this coupon below for complete information.

Ozalid
TRADE MARK REG. U. S. PAT. OFF.
WHITE PRINTS

OZALID CORPORATION
354 Fourth Avenue, New York, N. Y.

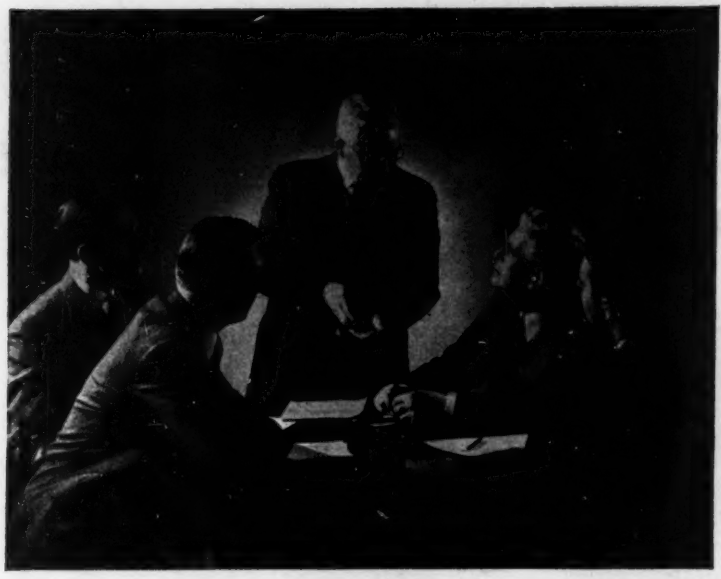
Please forward . . . without cost or obligation . . . complete information on the Ozalid Process, including prices and samples of prints.

Name.....

School.....

Street.....

City..... State.....



"KEWAUNEE Furniture is NOT High Priced—But it is TOPS in QUALITY!"

Men who know, buyers who thoroughly investigate what the market offers, invariably admit Kewaunee Furniture is "TOPS" in quality. Yet it is priced within reach of all. Not only does Kewaunee give you outstanding value, but it provides every convenience, plenty of room for students, better class control and inspiration to do better work by both students and teacher.

Send for Kewaunee Prices

Write for specifications and prices on furniture your school needs. Learn how your school can have this finer furniture at prices within its reach.

Kewaunee Mfg. Co.
LABORATORY FURNITURE EXPERTS

C. G. Campbell, Pres. and Gen. Mgr.
245 Lincoln St., Kewaunee, Wis.
Eastern Branch: 220 E. 42nd St., New York, N. Y.
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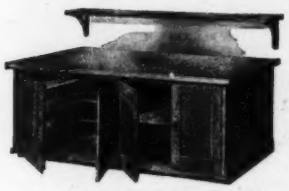
Representatives in Principal Cities



Glue and Stain Bench No. N-3154

Drawing Table No. BL-94

Metal Worker's Table No. N-3151

Single Manual Training Bench No N-3088

(Continued from page 18A)

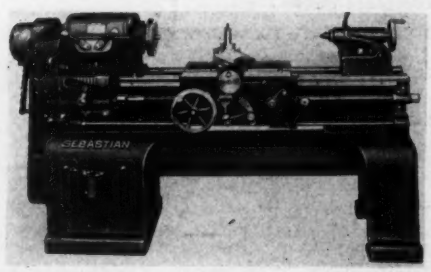
program is being arranged jointly by the local labor council and the school board.

¶ Through the recent death of Mrs. Ella Shaw Brown, the board of education of Grand Rapids, Mich., will inherit an estate valued at $42,180. It is not likely that the principal will be used to erect an industrial-arts building, as was intended, but the income will be used to purchase tools, machinery, and equipment for teaching industrial-arts work.

¶ A new vocational department will be opened in September, at Lockland, Ohio. The department will occupy enlarged quarters in the Lockland School.

New Products

¶ The new type H lathe announced by the Sebastian Lathe Company, Cincinnati, Ohio, possesses a number of important features which will give the user the most outstanding value in the medium-priced field. Following are some of the principal features: Chrome-hardened threads and spline on the lead screw and threads on the cross-feed screw, chrome-hardened tailstock spindle; Timken bearings on all shafts in the headstock, including the spindle; oversized, heat-treated, and hardened steel gears in headstock; all controls, knobs, and handles chromium plated; knob control handle for apron friction (no springs); feeds: 12-in., .00175–.111; 14 to 20 in., .002–.252; threads, 3 to 384; feed and thread changes, 72.



Many other desirable features also are incorporated, while an accuracy of .0005 in. at every point of alignment is rigidly maintained.

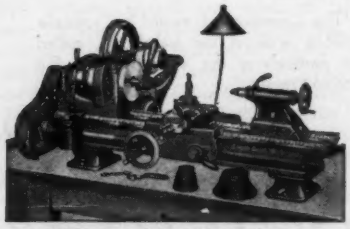
¶ Three new special-duty drills have just been added to the well-known line of Skilsaw drills. The new drills which are of 5/8-in., 3/4-in., and 7/8-in. capacity, combine low speed and high torque to bring a degree of drilling power which, until now, has been available only in heavy-duty production drills. They are light, compact, and priced to meet 1938 economy budgets. They can be used with carbon bits, with ship augers for deep drilling in wood and with hole saws for cutting clean holes up to 4 1/8-in. diameter.

All three models embody the most advanced engineering features in a quality construction. Triple reduction, helical-cut gears are of finest heat-treated steels for longer life and quieter running. Ball bearings on armature and Timken tapered roller bearings on chuck spindle insure smooth operation.

Descriptive material on these drills is obtainable by addressing Skilsaw, Inc., 310 Elston Avenue, Chicago, Ill.

¶ A new 12-speed 9-in. swing precision bench lathe has been announced by the South Bend Lathe Works, South Bend, Ind.

The new back-geared metalworking lathe provides spindle speeds ranging from 40 to 1200 r.p.m., cuts screw threads from 4 to 112 per inch, and has power longitudinal turning feeds of .002 to .015 in. A hardened and ground 3/4-in. alloy steel headstock spindle with ball thrust bearing is standard equipment with the lathe for precision machining at high speeds. The lathe has a 1/3-h.p. motor and adjustable horizontal counter-



9-in. precision bench lathe

The BLUE-PRINTING MACHINE DESIGNED FOR SCHOOL USE

NEW PEASE MODEL "3"

Especially adapted to classroom use Model "3" is noiseless, simple to operate, efficient, has low upkeep cost and is priced low. It will enable you to teach your students to produce high grade prints in sizes up to 42" wide and will give them the practical experience of operating Blue Printing equipment of professional standard.

Model "3" occupies very small space and is thoroughly modern in design. You can use it to handle your own blue printing requirements of course. Just ask for Model "3" pamphlet and prices.

The Pease Model "3" can be set on most any table or a standard can be furnished.

Although only on the market a short while there are already several hundred Model "3" printers in successful operation in practically all parts of the United States.

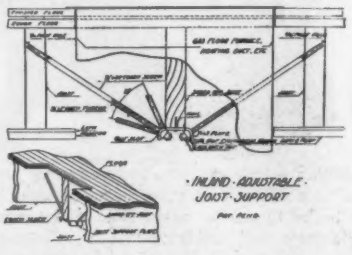
THE C. F. PEASE COMPANY

2603 West Irving Park Road Chicago, Illinois

shaft, with two-step pulleys for motor and countershaft to provide the range of speeds.

It also is equipped with gear reverse for right- and left-hand screw threads, a heavily designed saddle with adjustable gibs on the cross feed and compound rest, a precision lead screw, and hand-scraped V ways on lathe bed. Thirty-eight attachments for performing a variety of jobs such as grinding, draw-in collet chuck work, milling, taper work, and the like, are available. Write to the South Bend Lathe Works for a free copy of the new catalog No. 46-A.

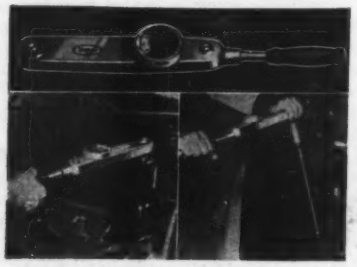
¶ The Inland Mfg. Co., 1120 N. Cicero Ave., Chicago, Ill., have announced the Inland Adjustable Joist Support, a new device for supporting joists which must be sawed to permit installation of heating, plumbing, or air-conditioning equipment. It provides full support for joists of



this kind and is quickly and easily installed. This device will support a dead weight of over a ton on a 2 by 6-in. joist. It can also be used where two or more joists are cut, and for supporting any joist that sags or is in a weakened condition.

A circular describing this new device is available on request to the Inland Mfg. Co.

¶ A new type of pressure measuring wrench, the "torqometer," has been announced recently by Snap-on Tools Corporation, Kenosha, Wis. The pressure readings are obtained by a new principle, with absolute accuracy — no springs whatever being used in the gauge. Among other improvements incorporated in the new tool is a floating-face dial in which the pointer is always stationary, with dial windows on both sides as



Snap-on torqometer

well as on top of the gauge, so readings may be taken conveniently from any position.

The Snap-on torqometer is especially suitable for replacing cylinder heads, since it enables the mechanic to tighten the heads and nuts to uniform tension, and thereby minimize cylinder-block distortion. The new tool is also valuable in tightening main bearings, manifold bolts, spark plugs, rear-axle nuts, drive-shaft pinions, brake-drum bolts, clutch assembly, and body bolts.

The head of the tool is designed to extend any ½-in. square drive socket or extension handle, and adaptor plugs fit this tool to sockets or extensions of other sizes. The entire tool is chromium plated, fitted with a new cushioned handle for a comfortable, nonslip, resilient hand grip.

¶ The Yates-American Machine Co., Beloit, Wis., has recently announced a new 14- and 16-in. band saw, which is offered for use in homes, schools, and light industry as part of the W line which now includes a lathe, drill press, jig, saw, jointer, circular saw, grinder, disk sander, belt sander, shaper, and all-purpose combination.

The band-saw frame is cast in one piece, with hinged wheel guards. A dust chute is built in as an integral part of the frame. Supported by machined cast-iron trunnions, the cast-iron table tilts

Continued on page 22A)

SEBASTIAN

Stremeline
CONE HEAD TYPE L
LATHE

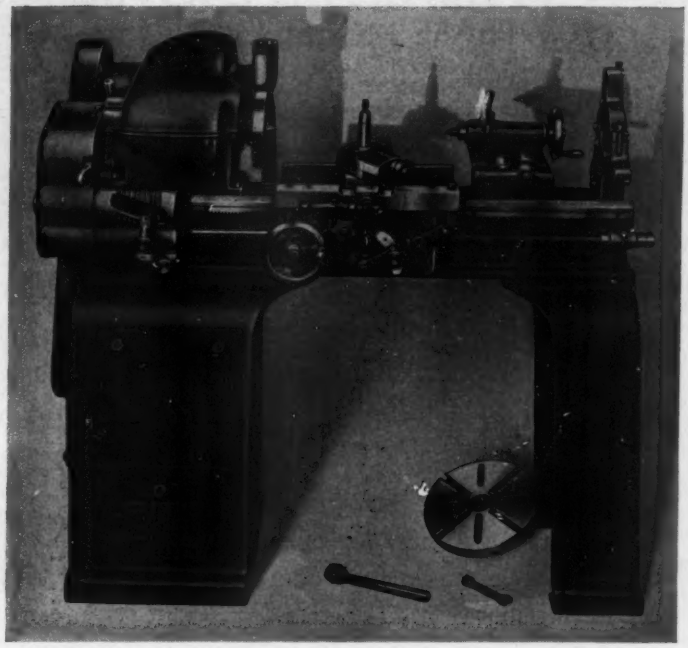
The new "Stremeline" cone head Lathe, built by Sebastian Lathe Company, presents to school shops as well as industry a lathe unsurpassed for safety, ease of operation and very pleasing appearance.

Check these modern, mechanically right, lathes for your new shop or when replacements are contemplated. They will assure you of many years of continuous service, and they are Safe.

There are many special features which you will be interested in checking. Send for circular which not only describes in detail the "Stremeline" lathes but also presents clear and instructive illustration of the special features.

Built in 10″, 12″, 13″, 15″, 16″, and 20″ sizes.

Write for information and prices today.



The Sebastian Lathe Co.
CINCINNATI, OHIO

(Continued from page 21A)

45 deg. right and 5 deg. left at the cutting line. A dial indicates the angle of tilt.

The blade is completely guarded. The top saw guide carries a steel saw guard which covers the saw in all its positions, and does not have to be adjusted separately. An industrial-type straining device is used to tension the blade. The top and bottom guides are readily accessible, and adjustments can be made with perfect safety.

Regular equipment includes a double-faced rip fence with micrometer adjustment, and table extension arms for increasing the cut-off capacity. Optional at a small extra cost are a cast-iron miter gauge equipped with taper-pin stops, and plane-type safety handle, and a set of extension arms for greater ripping capacity.

The saw is available in a bench or floor-type model, and with a belted motor or belt drive.

¶ A new attachment has been made available by the Cincinnati Grinders Incorporated, Cincinnati, Ohio, to users of the Cincinnati Nos. 2 and 3 centerless grinding machines. The precision

slide indicator attachment provides a quick and visible method of adjusting the regulating wheel slide to compensate for wheel wear and keep the work diameter within specified tolerances.

The indicator consists of a bracket which bolts to the upper slide, a steel rod carrying a contact dog, a supporting bracket which bolts to the machine bed, and a one-ten-thousandth dial indicator gauge having a 3-in. face.

The indicator gauge is located in a convenient position for visibility. It is protected against injury by a stop lug, limiting the movement of the indicator finger, after contact, to a distance of 2 in. When this limit is reached, the contact dog strikes the stop lug and slides back on the rod.

The attachment may easily be mounted on machines already in the field. A descriptive circular, No. G-415, is available from the Cincinnati Grinders Incorporated.

¶ Stanley Tools, offers a new No. 1017 Instrument Screw Driver, for tightening and loosening screws on eye-glass frames, small recording and dial instruments, small auto parts, locks, clocks, fishing reels, typewriters, radios, and innumerable other articles.

The handle is made of hexagon-shaped amber-colored "Stanloid," toughest nonmetallic substance known. The blade, 1½ in. long, is made of tempered steel and is nickel plated.

¶ The new 1939 model, Speedmatic "Speedliner" 8-in., medium-weight floor-sanding machine has just been announced by the Porter-Cable Machine Co., Syracuse, N. Y. The 1½-h.p. motor is nested in, rather than on, the chassis with two pull-out pins as a rear support, attaining a low center of gravity.

A balanced 8-in. sanding drum driven by a V belt travels at a surface speed of 3835 f.p.m. This drum is mounted on a brand new patented principle of rubber-mounted ball bearings that allow the drum to follow the surface of any floor without bearing strain. The drum arms are also mounted on Neoprene (synthetic nondeteriorating rubber) to absorb vibration and eliminate chatter marks.

Another strictly exclusive feature in this "Speedliner" is a swivel dust tube that allows the dust-bag to be turned to either side of the machine to eliminate wall rubbing.

A ratchet control affords quick adjustment of the drum pressure to equalize abrasive-paper wear. For use on either 110- or 220-volt current without wire change. Throw switch is mounted on the rear of the motor frame. The motor may be removed in less than one minute without the use of tools.

The "Speedliner" guards, frame, and motor

(Continued on page 24A)

REQUISITION

Dutch Kraft Wood Finishing Kits

Will you ? cut costs and do better finishing next year

The answer is "YES" if you use Dutch Kraft's Kits for your finishing. Quality assured by years of scientific research and production experience in developing wood finishing materials used by leading furniture factories in Grand Rapids and throughout the country. *Lower prices,* because Vocational Shops can buy at special direct-from-the-factory prices. Savings up to $7.64 for same quality in same quantities from ordinary sources, depending on shipping costs.

Right now — at requisition time — is the time to plan on Dutch Kraft Kits for next year. You are assured better work at less cost. Used and indorsed by leading Vocational Shop instructors.

ADVANTAGES OF DUTCH KRAFT WOOD FINISHING KITS

Three sizes, containing from 20 to 40 materials, ranging in price from $2.50 to $8.15.

Same quantities and quality of materials cost you less because you buy at direct-from-the-factory prices.

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I. A. 9

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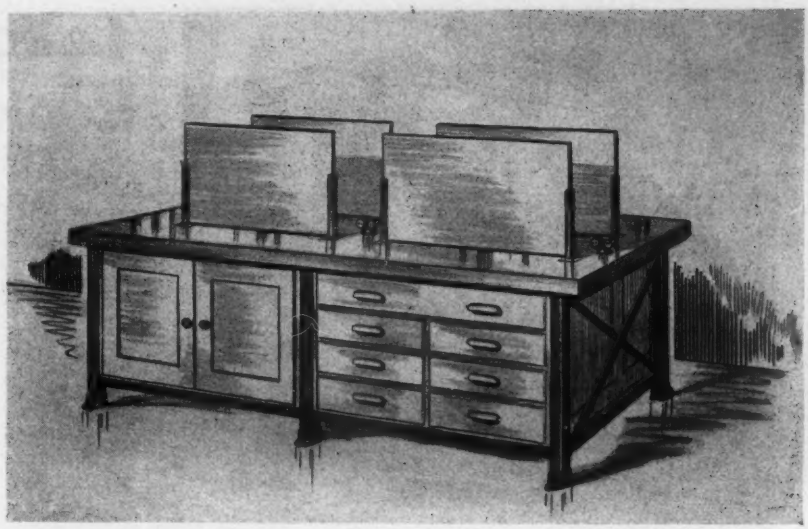
The bench is made of both steel and wood. The frame is of angle steel with steel reinforcements . . . all electrically welded together. The units, equipment, and top are wood. This duplex construction . . . steel frames for strength and wood units for low cost . . . is the same as used in Hamilton Lifetime Steelwood Manual Training Benches. Now installed in hundreds of modern manual training departments . . . it has demonstrated its ability to stand up under hard use.



The Electrical Bench shown above is only one of the many different pieces of equipment made by Hamilton for Manual Training and Industrial Arts Department. Write for information on these new, practical designs that are winning such universal approval.

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HAMILTON MFG. CO.

TWO RIVERS . . . WISCONSIN

(Continued from page 22A)

housing are aluminum alloy, highly polished. The chassis is made of malleable iron that will stand hard abuse. Rubber or canvas side wheels are optional.

¶ A development toward greater efficiency in jointers is in the new Monarch ball-bearing jointer put out by the American Saw Mill Machinery Co. of Hackettstown, N. J., whose executive and sales offices are now located at 120 Wall St., New York City.

This new woodworking tool has a clean, pleasing appearance together with a suggestion of strength and durability. The design is free from obstruction to the operator and the 3-point floor contact permits ease of installation.

The equipment furnished with or obtainable for the machine is so comprehensive and complete that every jointer requirement can be successfully met. This includes surfacing, squaring, beveling, and rabbetting. Concave or convex surfaces for spring glue joints also can be made. A convenient attachment for the jointer is the knife grinder, which is motor driven.

The jointer is equipped with the latest round safety head. This is mounted on heavy, precision-type ball bearings. It is available with the motor mounted directly on the cutterhead shaft, as listed, or it can be furnished with pulleys for flat or V-belt drive. The jointer knife grinder is furnished as extra equipment.

Trade News

¶ The new Cincinnati 12- and 16-in. universal grinding machines No. G-414 are described in a booklet recently issued by the Cincinnati Milling Machine and Cincinnati Grinder, Incorporated, Cincinnati, Ohio. These new universal grinding machines can be obtained for grinding 24, 36, 48, and 72 in. between centers. Some of the special features of these new grinders are that the spindle bearings are automatically lubricated, the bearings being compensated for changes in depth of grind from heavy roughing to fine finishing. The grinders have square gibbed slides, permanent back-lashed devices, built-in electrical controls, heavy one-piece beds, multiple V belt and chain drive and headstocks.

¶ The Metal & Thermit Corporation, 120 Broadway, New York, announces a new edition of its handy, pocket-size pamphlet on Murex welding rods.

Considerably revised and enlarged, the new issue contains brief data on the physical properties and chemical analysis of the weld metal deposited by each of the twenty-odd electrodes in the Murex line. Included are individual, specially designed electrodes for high-speed, downhand welding of mild steel; for all-position welding; for horizontal fillet work; for welding manganese, carbon-molybdenum, and nickel steels; for several types of stainless steels; and, for a number of the new high-strength, low-alloy steels.

The history of thermit welding, its principles, procedures, and applications are interestingly described in a booklet entitled "Thermit Welding," which is also obtainable on request from the Metal and Thermit Corporation.

¶ The rapid growth in the use of aluminum and its alloys has brought about a demand for methods particularly adapted to the joining of these materials. The Aluminum Company of America has just issued a revised edition of its booklet "Aluminum Welding." This booklet consists of 48 pages and is profusely illustrated. It contains special instructions for the welding of aluminum and its alloys, together with a brief description of the principles involved.

The needs of the practical welder have been kept in mind throughout this booklet, and no extended academic discussion of the problem has been attempted.

A copy of this booklet may be obtained from the Aluminum Company of America, Pittsburgh, Pa.

¶ The well-known machinist's manual "How to Run a Lathe," in a new 34th edition, has just been announced by the South Bend Lathe Works, South Bend, Ind.

The new book has 128 pages and contains over 350 illustrations, showing practically every type of lathe setup and methods for handling all important machining operations. It also includes reference tables and formulas, rules, gauges, specifications, shop hints, etc.

Copies can be obtained from the South Bend Lathe Works at 25 cents each, and will be mailed postpaid to any place in the world.

¶ The J. H. Williams Co., 75 Spring St., New York City offers two booklets, "Tools of Industry," and "How to Select and Use Wrenches" which will be helpful to students in learning the proper use of wrenches. They may be obtained from the Williams Company on request.

¶ The Frederick Post Company, Box 803, Chicago, Ill., have compiled on a 26 by 35-in. chart, 249 drafting symbols which were selected from more than twice that number, with the co-operation of architectural and engineering societies

(Continued on page 27A)

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Through
VISUAL INSTRUCTION
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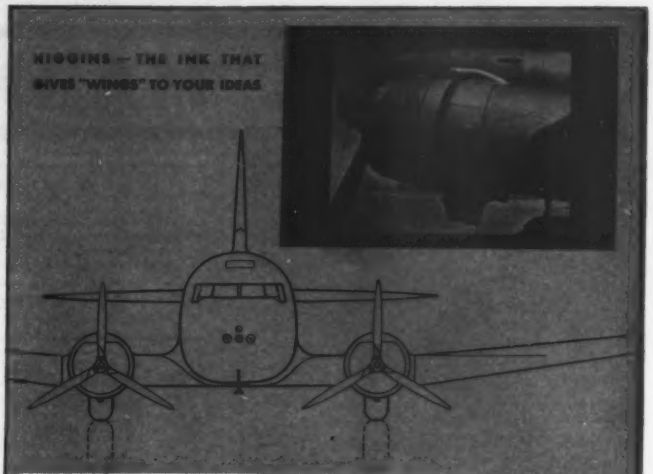

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HIGGINS

(Continued from page 24A)

and groups. This chart is now being distributed free to architects, engineers, and users of drafting-room supplies.

A request to the Frederick Post Company, Chicago, or a telephone call to the nearest Post distributor is all that is required to get the chart.

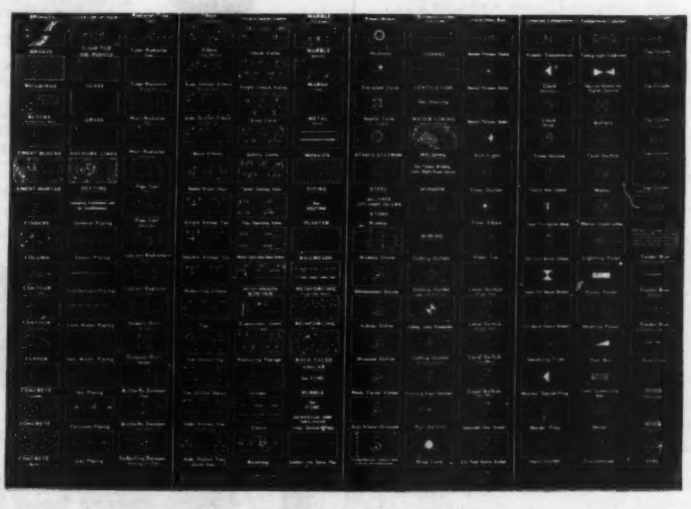

Chart showing drafting symbols

¶ "The Complete Machine Shop Lathe for Servicing Automobiles, Trucks, Buses, and Airplanes," is the title of a new bulletin just published by the South Bend Lathe Works, South Bend, Ind. It is available free of charge.

The bulletin is devoted nearly entirely to illustrations which show the methods for handling over 50 profitable automotive jobs on the 16-in. swing South Bend back-geared, screw-cutting precision lathe.

Besides these repair operations, the bulletin shows the method for servicing the steering system, servicing the clutch, servicing hubs, making special automotive replacement parts, cutting screw threads, testing and straightening bent shafts, sharpening reamers and cutters, filing, polishing, drilling, reaming, lapping, etc.

The bulletin also contains a large amount of general shop information invaluable to the automotive mechanic.

New Trade Catalogs

¶ Catalog No. 29, issued by the Atlas Press Company, Kalamazoo, Mich., describes two new Atlas back-geared screw-cutting lathes which have swinging diameters up to 6 in. These lathes are very compactly designed, have Timken spindle bearings, wide speed range, precision ground beds, and V-belt drive.

Catalog No. 30, issued by the same company, describes the new small Atlas shaper which has a stroke of ½–7 in., standard bull-geared-type drive, powered by V belts. The shaper has four speeds and five feeds in either direction.

¶ "Leathercraft" is a catalog which will be found very helpful by leather workers. In it are described the different types of leathers, the method of ordering them, and the tools that are to be used in leathercraft work. Numerous projects are also described and illustrated. The booklet is obtainable from the Charles Toebe Leather Company, 149 North Third St., Philadelphia, Pa.

¶ The 150-page spiral-bound Catalog No. 5 listing and describing chemical, bacteriological, pharmaceutical, medical, engineering, electrical and general scientific and other technical books of all American and British publishers, offered to technical workers by the Chemical Publishing Company of New York, Inc., 148 Lafayette St., New York City, met with such a great demand that

(Continued on page 29A)

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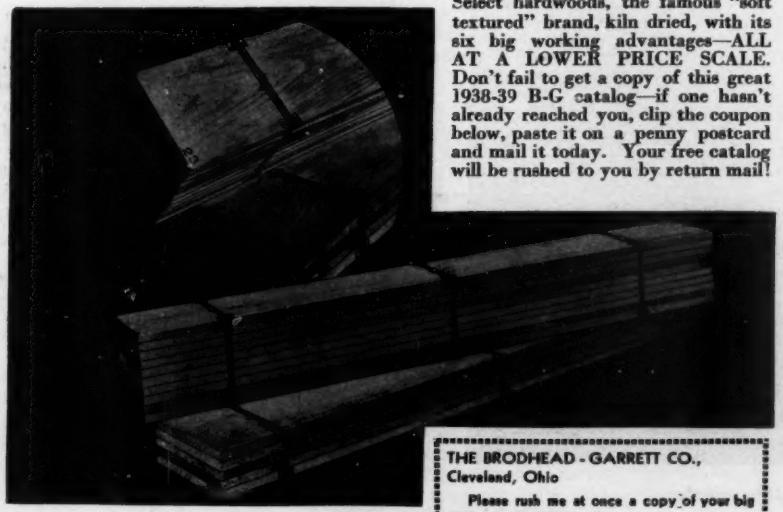

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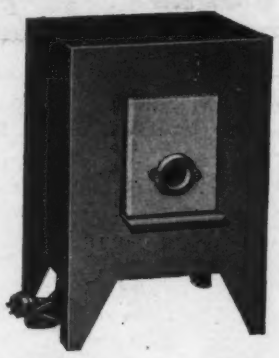

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A manual of simplified, easy-to-follow directions, showing beginners just how to make flat bows, bow-strings, arrows, and other archery tackle. 50c

The Bruce Publishing Co.-Milwaukee

(Continued from page 27A)

it is now out of print. Catalog No. 6, which is to take its place, is now ready and will be mailed to any chemist, engineer, scientist, or professor sending 10 cents in stamps or coin to cover mailing.

¶ Skilsaw, Inc., 3310 Elston Ave., Chicago, Ill., announce their new Catalog No. 40, which contains descriptions and prices of their portable electric handsaws, drills, belt sanders, disk sanders, grinders, blowers, floor sanders, and hedge trimmers.

¶ The 26th edition of the Starrett catalog is a 282-page book containing descriptions and prices of the more than 3,000 improved tools and standard items in the Starrett line. It also contains many photographic illustrations showing how precision tools are used in modern industrial plants. Copies of this new catalog may be obtained by writing to the L. S. Starrett Company, Athol, Mass.

New Publications

From Forest to Woodworker

By L. H. Noble and R. B. Everill. Cloth, 252 pages, 6 by 9, illustrated. Price, $1.75. The Bruce Publishing Company, Milwaukee, Wis.

An excellent book on related materials for the woodworking shop. It will be found helpful in elementary as well as in advanced industrial arts and vocational classes.

The information embodied in this work is designed to give the student an appreciation of the material with which he works, a knowledge of how it is found and how it is prepared for use by the workmen, and a comprehension of its applicability to the various types of jobs encountered by the men working with wood.

Besides the information on lumber and the lumbering industry, there are chapters on wood finishes, iron and steel, tools, wood fasteners, abrasives and cabinet hardware. The book also contains a very useful glossary.

First Steps in Weaving

By Ella Victoria Dobbs, B.S., A.M. Cloth, 86 pages, 6¼ by 9½, illustrated. Price, $1. Published by The Macmillan Company, New York City.

A book for the beginner. It is written in a plain style that, coupled with its clarity and completeness, will endear this book to anyone who is interested in or wants to become familiar with the ancient industry of the weaver.

Automotive Service

Vol. 1, cloth, 528 pages, 6⅜ by 9¼, illustrated. Price, $3.50.

Vol. 2, cloth, 514 pages, 6⅜ by 9¼, illustrated. Price, $3.75. By Ray F. Kuns, published by The Bruce Publishing Company, Milwaukee, Wis.

This encyclopedic digest covers all phases of automotive repair and maintenance. The material has been designed especially for apprentices training for vocational entry into the automotive-service field, for students of technical schools, and for those who while already working in the field desire to keep abreast of modern methods.

The two volumes are divided into 8 units, each of which can be used for a semester's work. Thus, the two books can be made the basis of a four-year course. The work may also be selected in such a manner that the two volumes are covered in two-year or one-year courses. Unit 1 is devoted to the service station; Unit 2 is devoted to frames, wheel suspension, steering and ride control; Unit 3, transmissions, clutches, universals, and front-wheel drive; Unit 4, rear systems and brakes.

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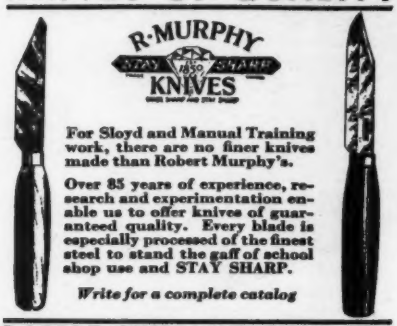

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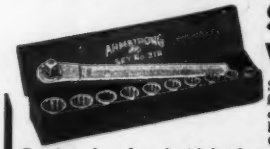

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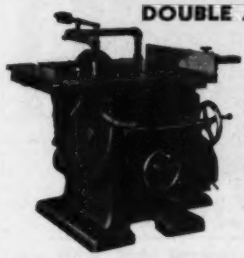

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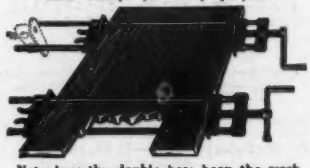

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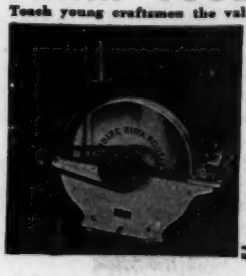

WET TOOL GRINDER A Wet Tool Grinder especially designed for School Shops, duplicating on a small scale, the conditions and technique used by the manufacturers of fine tools and cutlery. Large Nova Scotia stone—size 14" x 2". Patented Tool Holder insures perfect bevels and edges.

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AUTOMATIC OILSTONE New device makes easy accurate bevels and perfect edges. Coarse and fine in one reversible oilstone; micrometer adjustment. No moving parts—nothing to wear out. Price $4.85 postpaid. Both machines sent anywhere in the U. S. on approval.

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